WILLY A. HEREMAN

Emeritus Professor of Applied Mathematics
Research Professor Emeritus

DEPARTMENT OF APPLIED MATHEMATICS AND STATISTICS
COLORADO SCHOOL OF MINES
GOLDEN, COLORADO 80401-1887, U.S.A.

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PERSONAL DATA

Country and Year of Birth: Belgium, 1954

Citizenship: United States of America

University Address: Department of Applied Mathematics and Statistics
Chauvenet Hall, 1015 14th Street
Colorado School of Mines
Golden, CO 80401-1887
U.S.A.

Employment Status: Joined CSM in August 1989. Tenured in August 1995.
Research Professor Emeritus since November 2019
Emeritus Professor of Applied Mathematics since June 2016

Languages: Flemish, Dutch, English, French, some German

RESEARCH IDENTIFIERS

ORCID: 000-0001-7997-6601

Web of Science ResearcherID: E-7783-2010

Publons: 1401808

AREAS OF INTEREST

General: Applied Mathematics, Mathematical Modeling, Differential Equations, Theoretical Mechanics, Symbolic Computing

Emphasis: Nonlinear Wave Phenomena, Soliton Theory, Symmetry Analysis, Integrability, Software Development in Mathematica, Wavelets

DOCTORAL DISSERTATION

Ph.D. Applied Mathematics, University of Ghent, Belgium, 1982

Title:	Theoretical Aspects of Acousto-Optical Diffraction
Advisor:	Prof. Dr. Robert Mertens (deceased)

Contents

1 Education

- Diploma in Advanced Acoustics. Certificate courses organized by the Acoustical Society of The Netherlands and the Belgian Acoustical Society, Antwerp, Belgium, 1985.
- Ph.D. in Applied Mathematics, University of Ghent, Belgium, 1982, summa cum laude.
- M.S. in Applied Mathematics, University of Ghent, Belgium, 1976, magna cum laude. Thesis: Study of Nonlinear Dynamical Resonances.
- High School Teaching Diploma (certification), University of Ghent, Belgium, 1976, magna cum laude.
- B.S. in Mathematics, University of Ghent, Belgium, 1974, magna cum laude.

2 Employment History

2.1 Present Positions

- Research Professor Emeritus, Department of Applied Mathematics and Statistics, Colorado School of Mines, Golden, Colorado, November 2019-present.
- Emeritus Professor of Applied Mathematics, Department of Applied Mathematics and Statistics, Colorado School of Mines, Golden, Colorado, December 2016-present.

2.2 Former Positions

- Professor (in transitional retirement), Department of Applied Mathematics and Statistics, Colorado School of Mines, Golden, Colorado, August 2016-May 2019 (50% employment).
- Professor and Head, Department of Applied Mathematics and Statistics, Colorado School of Mines, Golden, Colorado, August 2012-June 2016.
- Professor and Interim Head, Department of Applied Mathematics and Statistics, Colorado School of Mines, Golden, Colorado, August 2011-August 2012.
- Professor, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado, August 1998-August 2011.
- Associate Professor, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado, August 1989–July 1998. Tenured since August 1995.
- Van Vleck Visiting Assistant Professor, Department of Mathematics, University of Wisconsin-Madison, Madison, Wisconsin, August 1986–July 1989.
- Honorary affiliation with the Center for the Mathematical Sciences (CMS), University of Wisconsin-Madison, August 1986–July 1989.

2.3 Postdoctoral Fellowships

- NATO Research Fellowships, Department of Electrical and Computer Engineering, University of Iowa, Iowa City, Iowa. Visiting Faculty, September 1985–July 1986 and September 1983–July 1984.
- Teaching and Research Assistant for courses in *Theoretical Mechanics* in the Faculty of Sciences, Departments of Mathematics, Computer Sciences and Physics, and the School of Engineering at the University of Ghent, Belgium, October 1976–September 1983, August 1984–September 1985.

3 Memberships of Professional Societies

- Member of the American Association for the Advancement of Science (AAAS), 2020-present.
- Member of the American Mathematical Society (AMS), 1990-present.
- Member of the American Society for Engineering Education (ASEE), 2012-2016.
- Member of Infinitum – Alumni Association of Ghent University, 2020-present.
- Member of the Mathematical Association of America (MAA), 1996-2002.
- Member of the Mathematics Alumni Society (QED) – Vereniging Oud-studenten Wiskunde, Ghent University, 2012-present.
- Full member of Sigma Xi – The Scientific Research Honor Society, 2019-present.
- Member of the Society for Industrial and Applied Mathematics (SIAM), 1986-present.
- Visiting Lecturer Panel, The Mathematical Association of America (MAA), 1996-1998.

4 Professional Activities and Service

4.1 Review Panel Service for Agencies

• National Science Foundation: Numeric, Symbolic, and Algebraic Computation Panel, Computing and Communications Foundations, Computer and Information Science and Engineering (CISE), May 6-7, 2010.

4.2 Review of Departments and Graduate Programs at Other Universities

• Academic program review of the Department of Mathematics, University of Colorado at Colorado Springs, February 27-28, 2020.

• Review of proposed Graduate Program in Applied Mathematics at the Department of Applied Mathematics, University of California at Merced, September 2013.

• Academic program review of the Department of Mathematics, University of Colorado at Colorado Springs, February 21-22, 2013.

4.3 Referee/Review Work for Journals, Publishers, Agencies, and Universities

Memberships of Editorial Boards

• Applicable Analysis (Taylor & Francis Group, London, U.K.) – Associate Editor (2008–2015).

• Applied Mathematics and Computation (Elsevier, The Netherlands) – Associate Editor (2011–2015).

• Arab Journal of Mathematics and Mathematical Sciences (AJMMS) (Research India Publication, Delhi, India) – Honorary Editor (2006–present).

• International Journal of Computational Mathematics and Numerical Simulation (IJCMNS) (Serials Publications, New Delhi, India) – Honorary Editor (2007–present).

• Kuwait Journal of Science (Kuwait University Publication Council, Kuwait) – Member International Advisory Board (2020–present).

• Mathematical and Computational Applications (MDPI, Basel, Switzerland) – Associate Editor (2016–2018).

• Pacific Journal of Applied Mathematics (PJAM) (Nova Science Publishing, New York) – Editor (2008–2015).

Journals

• Acta Physica Polonica A
• Advances in Mathematical Physics
• AIMS Mathematics
• American Journal of Computational Mathematics
• Annals of Physics
• Applicable Analysis
• Applied Mathematics–A Journal of Chinese Universities
• Applied Mathematics and Computation

- Applied Mathematics Letters
- Applied Optics
- Bulletin of the Belgian Mathematical Society – Simon Stevin
- Bulletin of the Iranian Mathematical Society
- Central European Journal of Engineering
- Chaos, Solitons & Fractals
- Chinese Physics Letters
- Communications in Nonlinear Science and Numerical Simulation
- Computers and Mathematics with Applications
- Computers in Physics
- Computer Physics Communications
- Discrete and Continuous Dynamical Systems
- Discrete Dynamics in Nature and Society
- European Journal of Applied Mathematics
- Europhysics Letters
- Foundations of Computational Mathematics
- Foundations of Physics
- Geophysical Research Letters
- Hacettepe Journal of Mathematics and Statistics
- IEEE Transactions on Sonics and Ultrasonics
- Indian Journal of Physics
- Il Nuovo Cimento
- International Journal of Computational Methods
- International Journal of Computers and Mathematics with Applications
- International Journal of Geometric Methods in Modern Physics (IJGMMP)
- Journal of Applied Fluid Mechanics
- Journal of Applied Mathematics and Mechanics
- Journal of Computational and Applied Mathematics
- Journal of Difference Equations and Applications
- Journal of Engineering Mathematics
- Journal of Mathematics
- Journal of Mathematical Analysis and Applications
- Journal of Mathematical Physics
- Journal of Nonlinear Mathematical Physics
- Journal of Physics A: Mathematical and Theoretical
- Journal of Symbolic Computation
- Journal of the Acoustical Society of America
- Journal of the Association of Arab Universities for Basic and Applied Sciences
- Journal of the Franklin Institute
- Kuwait Journal of Science
- Mathematica Slovaca
- Mathematical and Computer Modelling
- Mathematics and Computers in Simulation
- Mathematics in Computer Science
- Mathematical Methods in the Applied Sciences
- Mathematical Problems in Engineering
- Mathematical Reviews
- Nonlinear Analysis A: Theory, Methods and Applications
- Nonlinear Dynamics
- Numerical Functional Analysis and Optimization
- Numerical Methods for Partial Differential Equations
- Physica D
- Physica Scripta

- Physical Review B and E
- Physical Review Letters
- Physics Letters A
- Physics of Plasmas
- Physics Research International
- Proceedings of the Royal Society A
- Quarterly Journal of Mechanics and Applied Mathematics
- Reports on Mathematical Physics (Poland)
- Reviews in Mathematical Physics
- Scholarpedia: Peer-reviewed, open-access Encyclopedia
- Scientific Reports
- SIAM Journal of Applied Mathematics
- SIAM Review
- Symmetry
- Symmetry, Integrability and Geometry: Methods and Applications (SIGMA)
- The European Physical Journal Plus
- The IMA Journal of Applied Mathematics
- The Mathematica Journal
- Wave Motion
- Zeitschrift für Angewandte Mathematik und Physik (Journal of Applied Mathematics and Physics)
- Zeitschrift für Naturforschung A: Physical Sciences (Journal of Physics: Physical Sciences)

Proceedings International Conferences
- Asian Conference on Computer Mathematics (ASCM)
- International Symposium on Symbolic and Algebraic Computation (ISSAC)

Agencies
- American Mathematical Society (AMS)
- Engineering and Physical Sciences Research Council U.K. (EPSRC)
- Los Alamos National Laboratory
- National Science Foundation (NSF)
- NATO Scientific Committee (NATO)
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- South African National Research Foundation (NRF, formerly FRD)
- Stichting Wiskunde Onderzoek Nederland (SWON) (Foundation for Mathematical Research in the Netherlands)
- University of Cyprus Internal Research Funding Programme 2020
- U.S. Civilian Research and Development Foundation (CRDF)

Publishers
- Academic Press
- Addison-Wesley Publishing
- Birkhäuser Verlag
- Brooks/Cole Publishing
- Elsevier Publishing
- W. H. Freeman (Holtzbrinck) Publishers
- Harcourt Press
- John Wiley and Sons, Inc.
- Kluwer Academic Publishers
- McGraw-Hill Companies
- Prentice Hall
- Springer Verlag and Telos
- West Educational Publishing
- Wolfram Research, Inc.
- World Scientific Publishers Co.

Universities

- Brock University, St. Catharines, Ontario, Canada
- Cairo University, Cairo and Beni-Suef, Egypt
- Deakin University, Geelong, Victoria, Australia
- Jordan University of Science and Technology, Irbid, Jordan
- La Trobe University, Bundoora, Victoria, Australia
- Monash University, Clayton, Victoria, Australia
- Université de Montréal, Montréal, Quebec, Canada
- Université du Quebec, Trois-Revières, Quebec, Canada
- University of Antwerp, Antwerp, Belgium
- University of Colorado–Boulder, Boulder, Colorado
- University of Colorado–Colorado Springs, Colorado
- University of Ghent, Belgium
- University of KwaZulu-Natal, Durban, South Africa
- University of London, London, U.K.
- University of Saskatchewan, Saskatoon, Canada
- Stellenbosch University, Stellenbosch, Matieland, South Africa
- University of Texas – Pan American, Edinburg, Texas
- University of Texas, Tyler, Texas
- University of the Witwatersrand, Johannesburg, South Africa

4.4 Organization of Conferences, Minisymposia, Workshops, Special Sessions

- Member of the scientific committee of the "Tenth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", University of Georgia, Athens, Georgia, March 29-April 1, 2017.
- Co-organizer (with M. Usman and Ü. Göktaş) of a special session on "Analytical and Computational Techniques for Differential and Difference Equations," Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", Athens, Georgia, April 1-3, 2015.
- Member of the scientific committee of the "Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", University of Georgia, Athens, Georgia, April 1-3, 2015.
- Co-organizer (with C. Curtis, A. Dzhamay, and B. Prinari) of a special session on "Nonlinear Waves and Integrable Systems," AMS Spring Western Sectional Meeting, University of Colorado–Boulder, Boulder, Colorado, April 13-14, 2013.
- Member of the scientific committee of the "Eight IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", University of Georgia, Athens, Georgia, March 23-28, 2013.
- Co-organizer (with Ü. Göktaş) of a special session on "Symbolic and Numerical Aspects of Nonlinear Differential and Difference Equations," Eight IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", Athens, Georgia, March 23-28, 2013.
- Co-organizer (with T. Wolf) of the mini-symposium on "Novel Symbolic Methods to Investigate (Integrable) Nonlinear Differential Equations," 2012 SIAM Conference on Nonlinear Waves and Coherent Structures, University of Washington, Seattle, Washington, June 13-16, 2012.
- Co-organizer (with T. Wolf) of a mini-symposium on "Symmetries and Conservation Laws of Differential Equations with Applications," Seventh International Congress on Industrial and Applied Mathematics, ICIAM 2011, Vancouver, Canada, July 18-22, 2011.
- Organizer of a special session on "Symbolic and Numerical Computation in the Study of Nonlinear Differential and Difference Equations," Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, Athens, Georgia, April 4-7, 2011.

- Organizer of the mini-symposium on "Recent Advances in Continuous and Discrete Integrable Systems," 2009 SIAM Annual Meeting, Denver, Colorado, July 6-10, 2009.
- Organizer of a special session on "Integrability of Continuous and Discrete Evolution Systems," First Joint Meeting of American Mathematical Society and the New Zealand Mathematical Society, Victoria University of Wellington, Wellington, New Zealand, December 12-15, 2007 (with M. Hickman).
- Organizer of the mini-symposium on "Algorithms and Software to Compute Conservation Laws of Nonlinear PDEs," 2006 SIAM Conference on Nonlinear Waves and Coherent Structures, University of Washington, Seattle, Washington, September 9-12, 2006.
- Member scientific committee of the "International Symposium II on Unconventional Plasmas", Eindhoven University of Technology, Eindhoven, The Netherlands, August 14-16, 2006.
- Organizer of the mini-symposium on "Symmetries, Conservation Laws, and Integrability of Wave Equations," Fourth International Conference on Mathematical and Numerical Aspects of Wave Propagation, Colorado School of Mines, Golden, June 1-5, 1998.
- Co-organizer (with B. Komrakov) of the workshop on "Lie Symmetry Software with Applications to Nonlinear Problems," International Sophus Lie Center (ISLC), Nordfjordeid, Norway, June 17-27, 1996.
- Co-organizer (with E. Van Vleck) of the "Lookout Mountain Mini-Symposium on Differential Equations," Colorado School of Mines, Golden, Colorado, July 19, 1994.
- Co-organizer (with F. Schwarz) of the special session on "Symbolic Computations for Differential Equations," 14th IMACS World Congress on Computation and Applied Mathematics, Atlanta, Georgia, July 11-15, 1994.
- Co-organizer (with A. Boes) of the "Regional Meeting of the Mathematical Association of America," MAA Rocky Mountain Section, Colorado School of Mines, Golden, Colorado, April 1993.
- Co-organizer (with D. L. Russell) of MIPAC workshop on "Computational and Experimental Aspects of Control," Center for the Mathematical Sciences, University of Wisconsin, Madison, Wisconsin, May 16-18, 1988.

4.5 Consulting Activities and Corporate Outreach

- Flowline Risk Review, Colorado Oil and Gas Conservation Commission (COGCC), Department of Natural Resources, State of Colorado, in collaboration with W. Fleckenstein (PE), S. Bandyopadhyay (AMS); May 25-December 31, 2018.
- Advisor for the European Union Project on Algorithmic Integrable Systems in Action (ALISA).
- Tester for the beta version of Mathematica packages developed by Wolfram Research, Inc., Urbana-Champaign, Illinois, 1996.
- Small Business Innovative Research (SBIR) Program: Improved Sensitivity for Environmental Monitors through Innovative Application of Wavelets–Phase I, ADA Technologies, Inc., Englewood, Colorado, in collaboration with N. Bleistein, Center for Wave Phenomena (CWP), 1995-1996.
- The Bulldozer Project, Thunder Basin Coal Company, Wright, Wyoming, December 15, 1990-August 30, 1991, with William S. Murphy, Masters student.
- Nonlinear Optics, Rome Air Development Center, Rome, New York, in collaboration with P. P. Banerjee, Department of Electrical and Computer Engineering, Syracuse University, Syracuse, New York; June 6-18, 1988 and August 5-10, 1988.
- Course on Differential Equations, CSM Professional Outreach and Evening School.
- Course on Modeling with Symbolic Software, CSM Professional Outreach and Evening School.
- Short course on Mathematica Training Course for Industry, CSM Office of Special Programs and Continuing Education.
- Short course on Wavelets Theory and Industrial Applications, CSM Office of Special Programs and Continuing Education.

5 Teaching Experience

- Courses taught at the Colorado School of Mines:

- MACS 681: Nonlinear Mathematics (Nonlinear Waves)
- MACS 582: Programming with Mathematica
- MACS 582: Introduction to Wavelets
- MACS 581: Modeling with Mathematica
- MATH 556: Modeling with Symbolic Software
- MACS 526: Operations Research Projects
- MATH 515: Applied Mathematics II
- MATH 514: Applied Mathematics I
- MATH 510: Ordinary Differential Equations and Dynamical Systems
- MATH 503: Functional Analysis
- MATH 500: Linear Vector Spaces
- MACS 461: Senior Seminar I
- MACS 423: Special Topics: Linear and Vector Algebra
- MACS 423: Symbolic Computation (Independent Study)
- MACS 422: Introduction to Wavelets
- MATH 358: Algebraic Structures and Discrete Mathematics
- MATH 348: Advanced Engineering Mathematics
- MATH 342: Honors Linear Algebra
- MACS 333: Introduction to Mathematical Modeling
- MATH 332: Linear Algebra
- MACS 315: Differential Equations
- MATH 235: Honors Differential Equations
- MATH 225: Differential Equations (large lecture format)
- MATH 224: Honors Calculus III
- MATH 223: Honors Calculus III
- MATH 122: Honors Calculus II

- Course Coordinator: Advanced Engineering Mathematics, Differential Equations, Linear Algebra.

- Special and Short Courses taught:

- Nonlinear Dynamical Systems with Applications to Mathematical Biology Muizenberg, South Africa	African Institute for the Mathematical Sciences (AIMS), February-March 2008
- Dynamical Systems and Chaos Christchurch, New Zealand	Department of Mathematics and Statistics, Univ. of Canterbury July-October 2007
- Dynamical Systems and Chaos Christchurch, New Zealand	Department of Mathematics and Statistics, Univ. of Canterbury July-August 2004
- Introduction to Mathematica Stellenbosch, Matieland, South Africa	Department of Applied Mathematics, Stellenbosch University April 2001, March 2008
- Wavelets: Theory and Applications Stellenbosch, Matieland, South Africa	Department of Applied Mathematics, Stellenbosch University March 2001
- Wavelets: Theory and Applications Antwerp, Belgium	Department of Physics, University of Antwerp December 2000
- Wavelets: Theory and Applications Antwerp, Belgium	Department of Physics, University of Antwerp May 1996
- Differential Equations-Refresher Course Rocky Flats, Golden	Department of Energy April 1995
- Wavelets: Theory and Applications Golden, Colorado	Department of Mathematical and Computer Sciences October 1994
- Introduction to MACSYMA Golden, Colorado	Physics Department October 1990

- Course Development:

  - Applied Mathematics II
  - Applied Mathematics I
  - Introduction to Dynamical Systems and Chaos
  - Introduction to Mathematical Modeling (with computer projects)
  - Differential Equations (with computer projects)
  - Algebraic Structures and Discrete Mathematics
  - Nonlinear Waves
  - Modeling with Mathematica
  - Modeling with Symbolic Software
  - Functional Analysis
  - Introduction to Wavelets: Theory and Applications

- Courses taught at the University of Wisconsin–Madison:

  - Math 801: Nonlinear Waves
  - Math 727: Calculus of Variations and Optimal Control
  - Math 340: Linear Algebra
  - Math 320: Linear Algebra
  - Math 319: Ordinary Differential Equations
  - Math 112: College Algebra

- Teaching Assistant for courses in *Theoretical Mechanics* in the Faculty of Sciences, Departments of Mathematics, Computer Sciences and Physics, and the School of Engineering at the University of Ghent, Belgium, October 1976–September 1983.

- Full-time Research Assistant at the Institute for Theoretical Mechanics, Faculty of Sciences, University of Ghent, Belgium, October, 1976–September 1986.

6 Research

6.1 Funded Research

At the Colorado School of Mines

Synopsis: Total: $1,425,335. Funding by source: (i) National Science Foundation: $996,026, (ii) Department of Defense: $290,000, (iii) NATO, industry, State of Colorado, and other sources: $139,309.

1. Source: Department of Natural Resources – State of Colorado.
   Program: *Colorado Oil and Gas Conservation Commission (COGCC).*
   Title: *Flowline Risk Review: Risk analysis and monitoring of upstream oil, gas, and water flowlines.*
   Lead PI: W. Fleckenstein.
   Co-PIs: W. Hereman and S. Bandyopadhyay.
   Proposal Number: CT PHAA 2018*03557; CMS #110649.
   CSM Index Number (Banner): 430146.
   Amount: $36,099.
   Period: 05/25/2018-12/31/2018.
   Students Involved: Anna Thomas, Cooper Brown, and Marcus Merritt, undergraduate students.

2. Source: National Science Foundation.
   Directorate: Mathematical and Physical Sciences.
   Division: Mathematical Sciences.
   Program: Computational Mathematics.
   Title: *A High Order Adaptive Semi-Lagrangian WENO Method for the Vlasov Equation.*
   Subcontractor: J. Qiu (Univ. Houston, Texas).
   Award Number: DMS-0914852.
   Amount: $253,981.
   Period: 07/15/2009-06/30/2013.
   Person-Months or % of Effort: management & reporting.

3. Source: National Science Foundation.
   Program: Research Experiences for Undergraduates (REU).
   Title: *Symbolic Computation of Lax Pairs of Continuous and Discrete Completely Integrable Systems with Applications.*
   Award Number: CCF-0830783 (supplement).
   Amount: $16,000.
   Period: 09/01/2008-08/31/2012.
   Students involved: Oscar M. Aguilar, Sara M. Clifton, undergraduate students.

4. Source: National Science Foundation.
   Program: Research Experiences for Undergraduates (REU).
   Title: *Symbolic Software for Lax Pairs of Continuous and Discrete Completely Integrable Systems.*
   Award Number: CCF-0830783 (supplement).
   Amount: $16,000.
   Period: 09/01/2008-08/31/2012.
   Students involved: Janeen Neri, William Anthony "Tony" McCollom, undergraduate students.

5. Source: National Science Foundation.
   Program: Research Experiences for Undergraduates (REU).
   Title: *Symbolic Software for Lax Pairs and Conservation Laws of Nonlinear Partial Differential Equations.*
   Award Number: CCF-0830783 (supplement).
   Amount: $12,000.
   Period: 09/01/2008-08/31/2012.
   Students involved: Jacob D. Rezac, John-Bosco Tran, Travis "Alan" Volz, undergraduate students.

6. Source: National Science Foundation.
   Directorate: Computer and Information Science and Engineering (CISE).
   Division: Computing and Communications Foundations (CCF).
   Program: Numeric, Symbolic and Geometric Computation.
   Title: *Symbolic Software for Conservation Laws of Multi-Dimensional Continuous and Discrete Nonlinear Equations.*
   Award Number: CCF-0830783.
   Amount: $250,000.
   Period: 09/01/2008-08/31/2012.
   Person-Months or % of Effort: Summ: 1 month in Summers 2009, 2010, and 2011.

7. Source: National Research Foundation South Africa.
   Division: Information and Communication Technology.
   Program: Unlocking the Future.
   Title: *Radial Basis Functions, Subdivision, and Nonlinear Systems.*
   Proposal Number: FA2007032500003.
   Co-PI: B. Herbst (Univ. Stellenbosh, South Africa)
   Amount: R744,500 ($106,350), including R20,000 ($2,860) to support my research visit.
   Period: 01/01/2008-01/01/2011.
   Person-Months or % of Effort: 1 month in Spring 2008.

8. Source: National Science Foundation.
   Program: Research Experiences for Undergraduates (REU).
   Title: *Design and Implementation of Symbolic Algorithms for Exact Solutions of Systems of Nonlinear Partial Differential Equations and Differential-Difference Equations.*
   Award Number: CCR-9901929 (supplement).
   Amount: $12,000.
   Period: 06/16/2003-07/31/2004.
   Students involved: Adam T. Ringler and Ryan Sayers, undergraduate students.

9. Source: National Science Foundation.
   Program: Research Experiences for Undergraduates (REU).
   Title: *Design and Implementation of Symbolic Algorithms for Exact Solutions of Systems of Nonlinear Partial Differential Equations and Differential-Difference Equations.*

Award Number: CCR-9901929 (supplement).
Amount: $10,000.
Period: 03/22/2002-07/31/2003.
Students involved: Douglas E. Baldwin and Jack Sayers, undergraduate students.

10. Source: National Science Foundation.
Program: DMS-Infrastructure Program:
Scientific Computing Research Environments for the Mathematical Sciences (SCREMS).
Title: *Scientific Computing Research Environments for the Mathematical Sciences.*
PI: G. Fairweather.
Co-PIs: B. Bialecki, W. Hereman, A. Rockwood, and J. Wang.
Award Number: DMS-0215491.
Amount: $25,000 (excluding cost sharing by CSM with $25,092).
Period: 07/30/2002-07/30/2004.

11. Source: National Science Foundation.
Program: Research Experiences for Undergraduates (REU).
Title: *Design and Implementation of Symbolic Algorithms for Exact Solutions of Systems of Nonlinear Partial Differential Equations and Differential-Difference Equations.*
Award Number: CCR-9901929 (supplement).
Amount: $10,000.
Period: 02/02/2001-07/31/2002.
Students involved: Douglas E. Baldwin and Benjamin Kowalski, undergraduate students.

12. Source: National Science Foundation.
Directorate: Computer and Information Science and Engineering (CISE).
Division: Computer-Communications Research.
Program: Numeric, Symbolic and Geometric Computation.
Title: *Symbolic Software for the Study of Integrability of Nonlinear Partial Differential and Differential-Difference Equations.*
Award Number: CCR-9901929.
Amount: $233,645.
Period: 08/15/1999-07/31/2004.
Students involved: Douglas E. Baldwin, Paul T. Blanchard, John "Jack" M. Milwid, Matthew D. Porter-Peden, Jack Sayers, Ryan Sayers, and Adam T. Ringler, undergraduate students; Paul J. Adams and Holly L. Eklund, graduate students.

13. Source: Wolfram Research, Inc.
Program: Visiting Scholar Grants 2000.
Title: *Exact Solutions of Nonlinear Partial Differential Equations.*
Amount: air fare, lodging, lifetime free Mathematica software.
Period: 06/00/2000-03/01/2001.

14. Source: National Science Foundation.
Program: Research Experiences for Undergraduates (REU site).
Title: *REU Research in the Department of Mathematical and Computer Sciences at the Colorado School of Mines.*
Co-PIs: G. Fairweather and B. Bath.
Senior Participants: W. Hereman *et al.*
Award Number: 9912293.
Award: $49,673.
Period: 06/15/2000-06/14/2003.
Students involved: several undergraduate students.

15. Source: Colorado School of Mines.
Program: Technology Fee Committee.
Title: *Upgrading the Student PC Laboratory in Mathematical and Computer Sciences.*
Co-PI: X. Wu.
Amount: $7,854.
Period: Academic Year 1999-2000.
Students involved: undergraduate students in MCS courses, all MCS majors.

16. Source: National Science Foundation.
    Program: DMS-Infrastructure Awards.
    Scientific Computing Research Environments for the Mathematical Sciences (SCREMS).
    Title: *Computing Environments for Mathematical Sciences Research.*
    Co-PIs: W. Navidi, B. Bialecki, L. Tenorio, E. S. Van Vleck.
    Award Number: DMS-9872005.
    Amount: $37,595 (excluding cost sharing by CSM with $37,110).
    Period: 07/15/1998-06/30/2000.

17. Source: National Science Foundation.
    Program: Research Experiences for Undergraduates (REU site).
    Title: *Research in the Department of Mathematical and Computer Sciences at the Colorado School of Mines.*
    PI: E. S. Van Vleck and B. Bath.
    Co-PIs: B. Bialecki, N. Bleistein, G. Fairweather, W. Hereman, R. Krishnapuram, M. Misra, W. Navidi, S. Pruess, J. Scales, and L. Tenorio.
    Award Number: DMS-9732069.
    Amount: $55,000.
    Period: 08/01/1998-10/31/1999.
    Students involved: several undergraduate students.

18. Source: National Science Foundation.
    Program: Research Experiences for Undergraduates (REU).
    Title: *Design and Implementation of Integrability Tests in Mathematica for Systems of Nonlinear Differential Equations.*
    Award Number: CCR-9625421 (supplement).
    Amount: $5,000.
    Period: 05/01/1998-08/31/1999.
    Student involved: Michael D. Colagrosso, undergraduate student.

19. Source: Colorado School of Mines.
    Program: Curriculum Reform Committee and NSF Programs, Pedagogy and Process.
    Title: *Differential Equations: Creating an Applications Driven Course.*
    Co-PI: B. Bath.
    Amount: $4,996.
    Period: Summer and Fall 1997.
    Student involved: Nadine Filosi, graduate student.

20. Source: Colorado Advanced Software Institute (CASI).
    Program: CASI Undergraduate Research Grant Program.
    Title: *Computational Analysis of Electromagnetic Scattering.*
    Co-PIs: J. DeSanto and M. Misra.
    Amount: $3,000.
    Period: Academic Year 1997-1998.
    Student involved: Grant Erdmann, undergraduate student.

21. Source: Colorado School of Mines.
    Program: Technology Fee Committee.
    Title: *A Student Computing Laboratory in Mathematical and Computer Sciences.*
    Co-PI: B. Bath.
    Amount: $57,500 (excluding cost sharing by MCS Department with $15,000).
    Period: Fall 1996.
    Students involved: undergraduate and graduate students in MCS courses, all MCS majors.

22. Source: National Science Foundation.
    Directorate: Computer and Information Science and Engineering (CISE).
    Division: Computer-Communications Research.
    Program: Numeric, Symbolic and Geometric Computation.
    Title: *Symbolic Software for the Investigation of Nonlinear Partial Differential Equations.*
    Award Number: CCR-9625421.

Amount: $87,000 (excluding cost sharing by CSM with $14,908).
Period: 09/15/1996-08/31/1999.
Student involved: Ünal Göktaş, graduate student.

23. Source: National Science Foundation.
Program: Research Experiences for Undergraduates (REU).
Title: *Development of a Mathematica Program for the Painlevé Integrability Test of Nonlinear Differential Equations.*
Award Number: CCR-9300978 (supplement).
Amount: $5,000.
Period: 05/01/1996-08/31/1996.
Student involved: Antonio J. Miller, undergraduate student.

24. Source: Department of Defense.
Program: *Multi-disciplinary University Research Initiative (MURI).*
Air Force Office of Scientific Research (AFOSR) Computational Electromagnetics Initiative.
Title: *Electromagnetic Scattering from Rough Surfaces.*
Co-PIs: J. DeSanto and M. Misra.
Award Number: AFOSR Grant F49620-96-1-0039.
Amount: $290,000.
Period: 01/01/1995-12/31/2000.
Students Involved: Grant Erdmann, undergraduate student; Jeffrey Boleng, graduate student.

25. Source: National Science Foundation.
Program: DMS-Infrastructure Program:
Scientific Computing Research Environments for the Mathematical Sciences (SCREMS).
Title: *Mathematical Sciences Computing Research Environment.*
Co-PIs: E. S. Van Vleck, M. Misra, G. Fairweather, J. Scales.
Award Number: DMS-9506603.
Amount: $50,000 (excluding matching funds by CSM, amount: $80,655).
Period: Academic Year 1994-1995.
Students involved: Chris Elmer and Ünal Göktaş, graduate students.

26. Source: National Science Foundation.
Directorate: Computer and Information Science and Engineering (CISE).
Division: Computer-Communications Research.
Program: Numeric, Symbolic and Geometric Computation.
Title: *Development of Symbolic Software for Nonlinear Partial Differential Equations.*
Award Number: CCR-9300978.
Amount: $69,923 (excluding cost sharing by CSM with $4,000).
Period: 09/01/1993-08/31/1996.
Students involved: Chris Elmer and Ünal Göktaş, graduate students.

27. Source: National Science Foundation.
Program: Instrumentation and Laboratory Improvement (ILI).
Title: *Toward making Mathematics a Laboratory Science.*
Co-PIs: F. Hagin, B. Bath, R. Underwood, and J. Cohen.
Amount: $43,000 (excluding cost sharing by CSM with $43,000).
Period: Academic Year 1990-1992.

28. Source: Thunder Basin Coal Company, Wright WY.
Program: Advanced Computing.
Title: *The Bulldozer Project.*
Amount: $12,000 ($5,000 was student support).
Period: December 1990-July 1991.
Student involved: William S. Murphy, graduate student.

At Other Institutions

1. Source: North Atlantic Treaty Organization (NATO).
Title: Research Fellowship.

Amount: $7,000 (travel and living expenses) plus salary and benefits for 10 months.
Location: Department of Electrical and Computer Engineering, University of Iowa, Iowa City, Iowa.
Period: Academic Year 1985-1986.

2. Source: North Atlantic Treaty Organization (NATO).
Title: Research Fellowship.
Amount: $6,000 (travel and living expenses) plus salary and benefits for 10 months.
Location: Department of Electrical and Computer Engineering, University of Iowa, Iowa City, Iowa.
Period: Academic Year 1983-1984.

6.2 Undergraduate Research and Unfunded Research

- Field Sessions and REU Projects

1. Title: *Symbolic Computation of Soliton Solutions with a Homogenization Method.*
Program: Research Experiences for Undergraduates (REU).
Location and date: AMS, Colorado School of Mines, Spring and Summer 2012.
Sponsor: Supplemental Award, National Science Foundation.
Supervisors: Willy Hereman
Student involved: Andrew C. Cook, undergraduate student.
2. Title: *Symbolic Computation of Lax Pairs of Continuous and Discrete Completely Integrable Systems with Applications.*
Program: Research Experiences for Undergraduates (REU).
Location and date: MCS/AMS, Colorado School of Mines, Spring, Summer, Fall 2011, and Spring 2012
Sponsor: Supplemental Award, National Science Foundation.
Supervisors: Willy Hereman
Students involved: Oscar M. Aguilar, Sara M. Clifton, undergraduate students.
3. Title: *Symbolic Software for Lax Pairs of Continuous and Discrete Completely Integrable Systems.*
Program: Research Experiences for Undergraduates (REU).
Location and date: MCS, Colorado School of Mines, Spring and Summer 2010.
Sponsor: Supplemental Award, National Science Foundation.
Supervisors: Willy Hereman
Students involved: Janeen Neri, William Anthony "Tony" McCollom, Jacob D. Rezac, undergraduate students.
4. Title: *Symbolic Software for Lax Pairs and Conservation Laws of Nonlinear Partial Differential Equations.*
Program: Research Experiences for Undergraduates (REU).
Location and date: MCS, Colorado School of Mines, Summer 2009.
Sponsor: Supplemental Award, National Science Foundation.
Supervisors: Willy Hereman assisted by Douglas Poole and Terry Bridgman.
Students involved: Jacob D. Rezac, John-Bosco Tran, Travis "Alan" Volz, undergraduate students.
5. Title: *Development of Algorithms and* Mathematica *Software for the Symbolic Computation of Conservation Laws of System of PDEs in Multiple Dimensions.*
Program: Research Experiences for Undergraduates (REU).
Location and date: MCS, Colorado School of Mines, Summer 2004.
Sponsor: Field Session 2004 and Supplemental Award, National Science Foundation.
Supervisors: Willy Hereman and Michael D. Colagrosso.
Students involved: Lindsay M. Auble, Robert "Scott" C. Danford, Forrest Lundstrom, and Maxine von Eye, undergraduate students.
6. Title: *Development of Algorithms and* Mathematica *Software for Higher Euler and Homotopy Operators of Nonlinear Partial Differential Equations and Differential-Difference Equations.*
Program: Research Experiences for Undergraduates (REU).
Location and date: MCS, Colorado School of Mines, Summer 2003.
Sponsor: Field Session 2003 and Supplemental Award, National Science Foundation.
Clients: Willy Hereman and Michael D. Colagrosso.
Students involved: Ingo Kabirschke, Frances L. Martin, Kara Namanny, Adam T. Ringler, and Ryan Sayers, undergraduate students.

7. Title: *Design and Implementation of Symbolic Algorithms for Recursion Operators of Systems of Nonlinear Partial Differential Equations and Differential-Difference Equations.*
   Program: Research Experiences for Undergraduates (REU).
   Location and date: MCS, Colorado School of Mines, Summer 2002.
   Sponsor: Supplemental Award, National Science Foundation.
   Supervisor: Willy Hereman.
   Students involved: Douglas E. Baldwin and Jack Sayers, undergraduate students.

8. Title: *Design and Implementation of Symbolic Algorithms for Testing Exact Solutions of Nonlinear Partial Differential Equations.*
   Program: Research in the Department of Mathematical and Computer Sciences at the Colorado School of Mines.
   Location and date: MCS, Colorado School of Mines, Summer 2002.
   Sponsor: Research Experiences for Undergraduates (REU site), National Science Foundation.
   Supervisor: Willy Hereman.
   Students involved: Jason Blevins and Jeffrey Heath, undergraduate students.

9. Title: *Implementation of Symbolic Algorithms for Exact Solutions of Systems of Nonlinear Partial Differential Equations.*
   Program: Research Experiences for Undergraduates (REU).
   Location and date: MCS, Colorado School of Mines, Summer 2002.
   Sponsor: Supplemental Award, National Science Foundation.
   Supervisor: Willy Hereman.
   Students involved: Paul T. Blanchard, John "Jack" M. Milwid, and Matthew D. Porter-Peden, undergraduate students.

10. Title: *Design and Implementation of Symbolic Algorithms for Exact Solutions of Systems of Nonlinear Partial Differential Equations and Differential-Difference Equations.*
    Program: Research Experiences for Undergraduates (REU).
    Location and date: MCS, Colorado School of Mines, Summer 2001.
    Sponsor: Supplemental Award, National Science Foundation.
    Supervisor: Willy Hereman.
    Students involved: Douglas E. Baldwin and Benjamin Kowalski, undergraduate students.

11. Title: *Symbolic computation of tanh solutions of nonlinear partial differential equations.*
    Program: *Research in the Department of Mathematical and Computer Sciences at the Colorado School of Mines.*
    Location and date: MCS, Colorado School of Mines, Summer 2000.
    Sponsor: Research Experiences for Undergraduates (REU site), National Science Foundation.
    Supervisor: Willy Hereman.
    Students involved: Steve Formaneck, Andrew Menz, and Douglas E. Baldwin, undergraduate students.

12. Title: *Mathematica implementation of the computation of solitons via Hirota's bilinear method.*
    Program: Undergraduate Research.
    Location and date: MCS, Colorado School of Mines, Summer 1999.
    Sponsor: National Science Foundation.
    Supervisor: Willy Hereman.
    Student involved: Jeffrey Hanel, undergraduate student.

13. Title: *Mathematica implementation of a technique for solving PDEs through homogenization.*
    Program: Undergraduate Research.
    Location and date: MCS, Colorado School of Mines, Summer 1999.
    Sponsor: National Science Foundation.
    Supervisor: Willy Hereman.
    Student involved: Guy Somberg, undergraduate student.

14. Title: *Symbolic computation of tanh and sech solutions of nonlinear partial differential and differential-difference equations.*
    Program: Research in the Department of Mathematical and Computer Sciences at the Colorado School of Mines.
    Location and date: MCS, Colorado School of Mines, Summer 1999.
    Sponsor: Research Experiences for Undergraduates (REU site), National Science Foundation.

Supervisor: Willy Hereman.
Students involved: Linda Hong, Ryan S. Martino, and Joel Miller, undergraduate students.

15. Title: *Development of a Mathematica Program for the Painlevé Integrability Test for Systems of Nonlinear Differential Equations.*
Program: Research Experiences for Undergraduates (REU).
Location and date: MCS, Colorado School of Mines, Summer 1998.
Sponsor: Supplemental Award, National Science Foundation.
Supervisor: Willy Hereman.
Student involved: Michael D. Colagrosso, undergraduate student.

16. Title: *Development of a Mathematica Program for the Painlevé Integrability Test for Systems of Nonlinear Differential Equations.*
Program: Field Session.
Location and date: MCS, Colorado School of Mines, Summer 1997.
Client: Willy Hereman.
Student involved: Michael D. Colagrosso, undergraduate student.

17. Title: *Computational Modeling of Rough Surface Scattering.*
Program: MURI Project and Field Session.
Location and date: MCS, Colorado School of Mines, Summer 1996.
Clients: John DeSanto, Willy Hereman, and Manavendra Misra.
Students involved: Grant Erdmann, Amy Sinex, and Colleen Craig, undergraduate students.
Additional team members: Jeffrey Boleng and Morrakot Khebchareon, graduate students.

18. Title: *Design of a Mathematica Program for the Painlevé Test.*
Program: Research Experiences for Undergraduates (REU).
Location and date: MCS, Colorado School of Mines, Summer 1996.
Sponsor: Supplemental Award, National Science Foundation.
Supervisor: Willy Hereman.
Student involved: Antonio J. Miller, undergraduate student.

19. Title: *Development of a Mathematica Program for the Painlevé Integrability Test for Nonlinear Differential Equations.*
Program: Field Session.
Location and date: MCS, Colorado School of Mines, Summer 1995.
Client: Willy Hereman.
Students involved: Tracy Otto and Antonio J. Miller, undergraduate students.

- Collaborative Research Projects on Wavelets and Diffusion Maps (including software design)

  1. Barend Herbst, Department of Applied Mathematics, Stellenbosch University, Stellenbosch, Matieland, South Africa.

- Collaborative Research Projects on Integrability of Partial Differential Equations (PDEs), Differential-Difference Equations (DDEs), and Partial Difference Equations (PΔEs) : Symmetries, Conservation Laws, Lax Pairs, Special Solutions (including software design)

  1. Stephen Anco, Department of Mathematics and Statistics, Brock University, St.-Catharines, Ontario, Canada.

     Project: Nonlinear wave equations, conservation laws, symmetries.

  2. Rehana Naz, Center for Mathematics and Statistical Sciences, Lahore School of Economics, Lahore, Pakistan.

     Project: Nonlinear PDEs of elastic materials, conservation laws, symmetries.

  3. Ünal Göktaş, Department of Computer Science and Engineering, Texas A&M University, Galveston & College Station, Texas.

     Project: Soliton solutions using the simplified Hirota method.

  4. Frank Verheest, Department of Mathematical Physics and Astronomy Research, University of Ghent, Gent, Belgium.

     Project: Gardner equation in plasma physics.

5. Carel Olivier, Department of Mathematics and Applied Mathematics, North-West University, Mahikeng, South Africa

   Project: Properties and solutions of the Gardner equation.

6. Michel Grundland, Centre de Recherches Mathématiques, Université de Montréal, Montréal, Québec, Canada.

   Project: Symmetries of the Chaplygin and Born-Infeld equations.

7. Robert Kragler, Fachhochschule Ravensburg-Weingarten/University Applied Sciences, University of Weingarten, Weingarten, Germany.

   Project: Exact solutions of nonlinear PDEs.

8. Pavlos Xenitidis, Department of Mathematics, Computer Science, and Engineering, Liverpool Hope University, Liverpool U.K.

   Project: Symmetries of partial difference equations.

9. Evelyne Hubert, Institut National de Recherche en Informatique et en Automatique (INRIA), Sophia Antipolis, France.

   Project: Recursion operators of nonlinear PDEs.

10. Peter van der Kamp, Department of Mathematics, La Trobe University, Bundoora (Melbourne), Victoria, Australia.

    Project: Recursion operators of nonlinear PDEs.

6.3 Students Advised

At Colorado School of Mines (Masters and Ph.D. Theses):

Ph.D. Students Advised

- Terry J. Bridgman (Advisor), *Symbolic Computation of Lax Pairs of Nonlinear Partial Difference Equations*, August 2018.
- Loren "Douglas" Poole (Advisor), *Symbolic Computation of Conservation Laws of Nonlinear Partial Differential Equations Using Homotopy Operators*, December 2009.
- Ünal Göktaş (Advisor), *Algorithmic Computation of Symmetries, Invariants and Recursion Operators for Systems of Nonlinear Evolution and Differential-difference Equations*, May 1998.
- Ameina S. Nuseir (Advisor), *Symbolic Computation of Exact Solutions of Nonlinear Partial Differential Equations using Direct Methods*, May 1995.

Master Students Advised

- Jacob D. Rezac (Advisor), *Computation of Scaling Invariant Lax Pairs with Applications to Conservation Laws*, May 2012.
- Jennifer W. Larue (Advisor), *Symbolic Verification of Operator and Matrix Lax Pairs for Completely Integrable Nonlinear Partial Differential Equations*, May 2011.
- Douglas E. Baldwin (Advisor), *Symbolic Algorithms and Software for the Painlevé Test and Recursion Operators for Nonlinear Partial Differential Equations*, May 2004.
- Holly L. Eklund (Advisor), *Symbolic Computation of Conserved Densities and Fluxes for Nonlinear Systems of Differential-Difference Equations*, May 2003.
- Paul J. Adams (Advisor), *Symbolic Computation of Conserved Densities and Fluxes for Systems of Partial Differential Equations with Transcendental Nonlinearities*, May 2003.
- Ünal Göktaş (Advisor), *Symbolic Computation of Conserved Densities for Systems of Evolution Equations*, May 1996.
- William S. Murphy (Advisor), *Determination of a Position Using Approximate Distances and Trilateration*, May 1992.
- Wuning Zhuang (Advisor), *Symbolic Computation of Exact Solutions of Nonlinear Evolution and Wave Equations*, December 1991.

REU Students Advised (visiting from other universities)

- Jeffrey Heath (Georgetown College, Georgetown, Kentucky, REU site 2002)
- Jason Blevins (North Carolina State University, Raleigh, North Carolina, REU site 2002)
- Benjamin Kowalski (Kenyon College, Gambier, Ohio, REU 2001)
- Andrew Menz (Central College, Pella, Iowa, REU site 2000)
- Steve Formaneck (University of Minnesota, Morris, Minnesota, REU site 2000)
- Linda Hong (Harvard University, Cambridge, Massachusetts, REU site 1999)
- Joel Miller (Harvey Mudd College, Claremont, California, REU site 1999)

CSM Undergraduate Research Students Advised

- Andrew C. Cook (REU 2012)
- Sara M. Clifton (REU 2011 and 2012)
- Oscar M. Aguilar (REU 2011 and 2012)
- Brenden R. Ortiz (REU 2011)
- Jacob D. Rezac (REU 2009 and REU 2010)
- Janeen Neri (REU 2010)
- William Anthony "Tony" McCollom (REU 2010 and REU 2011)
- John-Bosco Tran (REU 2009)
- Travis "Alan" Volz (REU 2009)
- Forrest Lundstrom (REU 2004)
- Lindsay Auble (REU 2004)
- Robert "Scott" Danford (REU 2004)
- Maxine von Eye (REU 2004)
- Adam T. Ringler (REU 2003)
- Ryan Sayers (REU 2002 and REU 2003)
- Frances L. Martin (Field Session 2003)
- Kara M. Namanny (Field Session 2003)
- Ingo Kabirschke (Field Session 2003)
- Jack Sayers (REU 2002)
- Matthew D. Porter-Peden (REU 2002)
- Paul T. Blanchard (NSF 2002)
- John "Jack" M. Milwid (NSF 2002)
- Dylan W. Jones (Davidson Institute 2002)
- Douglas E. Baldwin (REU 2000, 2001, and 2002)
- Ryan S. Martino (REU site 1999)
- Steven Nicodemus (NSF 1998)
- Michael D. Colagrosso (REU 1997 and REU 1998)
- Jeffrey Hanel (NSF 1999)
- Guy Somberg (NSF 1999)
- Grant D. Erdmann (Air Force and NSF 1997, 1998 and 1999)
- Antonio J. Miller (REU 1995 and REU 1996)

At the University of Ghent (Masters Students):

- Anne Meerpoel (Advisor), *Direct Method to Construct Soliton Solutions*, June 1985.
- Anne Van Immerzeele (Advisor), *Theoretical Study of Dispersive Evolution Equations and Their Exact Soliton Solutions*, June 1983.
- Erika Dedeyne (Advisor), *Theoretical Study of the Toda Lattice*, June 1982.
- Rony De Spiegeleere (Advisor), *The Tippe-Top*, June 1980.
- Eddy Dewijngaert (Advisor), *Non-resonant Wave Interactions for Classes of Korteweg-de Vries Equations*, June 1980.
- Ivan De Winne (Advisor), *Dynamical Models for Ecological Problems*, June 1979.

6.4 Other Research Contributions

Service on Graduate Committees at CSM

Recent Ph.D. Committees at CSM

• Aaron Prunty (Geophysics: anticipated graduation, December 2019. Replaced by P. A. Martin after May 2019 due to my retirement)
• Kerri Stone (Electrical Engineering and Computer Science: May 2013)
• Laith Haddad (Engineering Physics, December 2012)
• Tonya Lauriski-Karriker (Applied Mathematics and Statistics, May 2012)
• Lyn Canter (Geology and Geological Engineering, December 2010)
• Ashlyn Hutchinson (Mathematical and Computer Sciences, May 2009)
• Keith Rozenburg (Metallurgical and Materials Engineering, December 2008)
• Lixin Sun (Chemical Engineering, December 2003)
• Jeffrey Boleng (Mathematical and Computer Sciences, May 2002)
• Antonio Nieto Vega (Mining Engineering, December 2001)
• Lan Wang (Mathematical and Computer Sciences, December 2000)
• Raphaël Pieters (Metallurgical and Materials Engineering, May 1999)
• Wenjie Song (Engineering Physics, May 1999)
• Carlos Theodoro (Geophysics, May 1999)
• Joe Lederhos (Chemical Engineering and Petroleum Refining, June 1997)
• Mohammed Abdulrahim (Mathematical and Computer Sciences, December 1997)
• Wei Zhang (Mathematical and Computer Sciences, May 1997)
• Hong Sung Jin (Mathematical and Computer Sciences, May 1995)
• Mehmet Hakan Karazincir (Geophysics, May 1995)
• Arthur Bertanzetti (Mathematical and Computer Sciences, May 1994)
• Kidane Araya (Geophysics, May 1993)

Recent Masters Committees at CSM

• Courtney Moore (Rohde) (Applied Mathematics and Statistics, December 2013)
• Kelley Commeford (Engineering Physics, May 2012)
• Joseph D. Schneiderwind (Applied Mathematics and Statistics, December 2011)
• Christie A. O'Hara (Mathematical and Computer Sciences, December 2010)
• Rachel Miller (Mathematical and Computer Sciences & Engineering Physics, May 2010)
• Bryan Whalen (Mathematical and Computer Sciences, May 2006)
• Elena Dabbs (Mathematical and Computer Sciences, May 2005)
• Yu Jiang (Mathematical and Computer Sciences, May 2004)
• Steven Shaeffer (Mathematical and Computer Sciences, December 1999)
• Edward W. Swim (Mathematical and Computer Sciences, December 1999)
• Aleksandr Safray (Mathematical and Computer Sciences, May 1999)
• Lihua Yang (Mathematical and Computer Sciences, May 1997)
• L. Douglas Poole (Mathematical and Computer Sciences, May 1997)
• Hong Sung Jin (Mathematical and Computer Sciences, September 1993)
• Lixiu Huang (Mathematical and Computer Sciences, December 1998)

Service on Masters and Ph.D. Thesis Committees at Other Universities

• Nkululeko Mindu, (Masters Student, Computational and Applied Mathematics, University of the Witwatersrand, Johannesburg, South Africa, June 2014)
• Avnish Magan, (Masters Student, Computational and Applied Mathematics, University of the Witwatersrand, Johannesburg, South Africa, May 2014)
• Douglas E. Baldwin (Ph.D. Student, University of Colorado, Boulder, May 2013)
• Bienvenue F. Nteumagne (Masters Student, University of KwaZulu-Natal, Durban, South Africa, May 2011)
• Letlhogonolo D. Moleleki (Masters Student, North-West University, Mafikeng Campus, South Africa, May 2012)
• Stéfan J. van der Walt (Ph.D. Student, Stellenbosch University, Stellenbosch, Matieland, South Africa, December 2010-present)

• Omar Rojas (Ph.D. Student, La Trobe University, Bundoora (Melbourne), Victoria, Australia, December 2009)
• Carel P. Olivier (M.S. Student, Stellenbosch University, Stellenbosch, Matieland, South Africa, December 2008)
• Henri M. Hakl (Ph.D. Student, Stellenbosch University, Stellenbosch, Matieland, South Africa, December 2007)
• Lorenzo Magaia (Ph.D. Student, Stellenbosch University, Stellenbosch, Matieland, South Africa, December 2006)
• John D. Butcher (Masters Student, Deakin University, Geelong, Australia, December 2004)
• Philippe Picard (Ph.D. Student, Université de Montréal, Montréal, Canada, December 2003)
• Rochelle M. Edelstein (Ph.D. Student, University of KwaZulu-Natal, Durban, South Africa, June 2003)
• Nasser Elsaid Elazab (Ph.D. Student, Cairo University, Cairo, Egypt, December 2001)
• Ruby van Rooyen (Masters Student, Stellenbosch University, Stellenbosch, Matieland, South Africa, December 2000)
• Michael A. Barco (Ph.D. Student, La Trobe University, Australia, June 2000)
• Khai Vu (Ph.D. Student, Monash University, Australia, December 1998)
• Bernard Deconinck (Ph.D. Student, University of Colorado, Boulder, May 1998)
• Alaa Hashem Abdel-Hamid (Masters Student, Cairo University, Beni-Suef, December 1997)
• Mohamed Ali Ayari (Ph.D. Student, Université de Montréal, Montréal, Canada, May 1997)

Service on Graduate Committees at the University of Wisconsin-Madison:

• Served on 4 Ph.D. Thesis Committees

Sabbatical Leaves

- Academic Year 2007-2008
  Study of Theory and Applications of Diffusion Maps and continuation of project on Discrete Integrable Systems, with Prof. Barend Herbst and Dr. Karin Hunter, Department of Mathematics, *Stellenbosch University*, Stellenbosch, Matieland, South Africa, March 16-May 2, 2008.

  Taught course (jointly with Prof. Keshlin Govinder) on "Nonlinear Dynamical Systems with Applications to Mathematical Biology," at the African Institute for the Mathematical Sciences (AIMS), Muizenberg (Cape Town), South Africa, February 20-March 15, 2008.

  Symbolic Computation of Lax Pairs of Nonlinear Partial Difference Equations, with Prof. Reinout Quispel, Department of Mathematics and Statistics, *La Trobe University*, Bundoora, Melbourne, Australia, November 4-December 3, 2007.

  Study of Conservation Laws of Multi-Dimensional Nonlinear PDEs and Lattices, with Prof. Mark Hickman. Taught a semester course on Dynamical Systems and Chaos at the Department of Mathematics and Statistics, *University of Canterbury*, Christchurch, New Zealand, July 1-November 3, 2007 and December 4-17, 2007.

  Study of CP^{N-1} sigma models and the immersion of two-dimensional surfaces in multi-dimensional Euclidean spaces, with Prof. Michel Grundland, *Centre de Recherches Mathématiques, Université de Montréal*, Montréal, Québec, Canada, May 23-June 1, 2007.

- Academic Year 2000-2001
  Study of Discrete Integrable Systems, with Prof. Barend Herbst; Series of Lectures on Wavelets: Theory and Applications and Introduction to Mathematica, Department of Applied Mathematics, *Stellenbosch University*, Stellenbosch, Matieland, South Africa.

  Tanh Project with Dr. W. Malfliet, and Series of Lectures on Wavelets: Theory and Applications, Ph.D. Program DOCOP, Department of Physics, *University of Antwerp*, Antwerp, Belgium, December 4–22, 2000.

  Exact Solutions of Nonlinear Partial Differential Equations, with Ünal Göktaş, Wolfram Research, Inc., Visiting Scholar Grants Program, *Champaign, Illinois*, October 25-November 11, 2000.

- Academic Year 1993-1994
  Study of Wavelets and Applications, with Prof. Gregory Beylkin, Program in Applied Mathematics, *University of Colorado–Boulder*, Boulder, Colorado.

Study of Integrability, Symmetries and Special Solutions of Evolution Equations, with Prof. F. Verheest, Institute for Theoretical Mechanics, *University of Ghent*, Belgium, October 25, 1993-January 2, 1994.

Research Visits

1. Prof. Stephen Anco, Department of Mathematics and Statistics, Brock University, *St.-Catharines, Ontario, Canada*, October 7-19, 2024.
2. Profs. Barbara Prinari and Gino Biondini, Department of Mathematics, The State University of New York at Buffalo, *Buffalo, New York*, May 1-5, 2024.
3. Prof. Em. Frank Verheest, Astronomy Observatorium, *University of Ghent*, Belgium, May 24, 2013. Prof. Verheest was visiting Mines/Boulder, May 24-June 2, 2018, and May 7-17, 2024.
4. Dr. Pavlos Xenitidis, School of Mathematics, Computer Science and Engineering, Liverpool Hope University, *Liverpool, U.K.*, February 16-20, 2020.
5. Dr. Evelyne Hubert (INRIA, France), Nov. 6-18, 2018 at ICERM, Providence, Rhode Island. Dr. Hubert was visiting CSM in August 25-31, 2013.
6. Dr. Pavlos Xenitidis, School of Mathematics, Statistics, and Actuarial Science, University of Kent, *Canterbury, U.K.*, March 27-29 and July 10-17, 2017.
7. African Institute for the Mathematical Sciences (AIMS), Muizenberg, Cape Town, South Africa, April 16-22, 2014.
8. Prof. Ünal. Göktaş, Turgut Özal University, *Ankara, Turkey*, June 18-July 7, 2011.
9. Isaac Newton Institute for Mathematical Sciences, *Cambridge, U.K.*, July 24-31, 2001; November 10-18, 2001; and June 3-July 3, 2009.
10. Prof. Peter Hydon, Department of Mathematics, University of Surrey, *Guildford, U.K.*, June 22-25, 2009.
11. Dr. Keshlan Govinder, *University of KwaZulu-Natal, Durban, South Africa*, April 5-9, 2008.
12. Prof. Michel Grundland, Centre de Recherches Mathématiques, Université de Montréal, *Montréal, Québec, Canada*, October 31-November 1, 2002, May 15-28, 2006, and May 23-June 1, 2007.
13. 2004 Erskine Fellowship. Visit with Dr. Mark Hickman, Department of Mathematics and Statistics, *University of Canterbury, Christchurch, New Zealand*, June 13-August 20, 2004.
14. Prof. Fazal Mahommed, School of Computational and Applied Mathematics, University of the Witwatersrand, *Johannesburg, South Africa*, May 20-23, 2001.
15. Prof. Peter Leach, Department of Mathematical and Statistical Sciences, University of KwaZulu-Natal, *Durban, South Africa*, April 18-23, 2001.
16. Visiting Scholar Program, Wolfram Research Inc., Champaign, Illinois, October 25-November 11, 2000.
17. Mathematical Sciences Research Institute, Berkeley, California, October 11-24, 1998.
18. Dr. Jan Sanders, *Vrije Universiteit of Amsterdam*, Amsterdam, The Netherlands, January 4, 1994, June 18-23, 1995, August 11-21, 1998, August 10-20, 1999, July 13-20, 2001, and August 2, 2003.
19. Prof. Willy Malfliet, Department of Physics, *University of Antwerp*, Antwerp, Belgium, January 3-20, 1994, December 4-22, 2001, December 19, 2002, June 23-24, 2003, and December 22-23, 2003.
20. Profs. Louis Marchildon and Michel Grundland, Departement de Physique, *Université du Québec à Trois-Rivières*, Québec, Canada, January 4-13, 1992.
21. Profs. W. Sarlet and F. Verheest, Institute for Theoretical Mechanics, *University of Ghent*, Belgium, December 16-20, 1991; and October 25, 1993-January 2, 1994. January 3-6, May 24-June 6, 1988; December 23 and 27, 2002.
22. Profs. Pavel Winternitz and Michel Grundland, Center de Recherches Mathématiques, *Université de Montréal*, Quebec, Canada, January 18-27, 1989; June 8-19, 1989; January 4-9, 1990; and June 11-18, 1994.

23. Prof. Partha P. Banerjee, Department of Electrical and Computer Engineering, *Syracuse University*, Syracuse, New York, April 9-May 17, 1985; March 31-April 14, 1986; May 29-June 4, 1987; August 6-11, 1988, and June 6-18, 1988.

24. Profs. Robert A. Mertens, Willy Sarlet and Frank Verheest, Institute for Theoretical Mechanics, *University of Ghent*, Belgium, May 11-25, 1987; January 2-4, 1990.

25. Prof. Felix M. Arscott, Department of Applied Mathematics, *University of Manitoba, Winnipeg*, Manitoba, Canada, April 23-May 6, 1981; and May 23-30, 1984 (within the Link of Fellowship between UM and RUG).

7 Publications

Synopsis: 1 edited book, 1 special issue of journal, 12 contributions to books, 2 journal papers in preparation, 68 articles in refereed research journals, 29 articles in refereed conference proceedings, 8 papers in non-refereed proceedings, 3 book reviews, 8 technical reports, 2 theses, 2 research monographs, 10 additional book reviews (not listed), and 28 conference abstracts (not listed).

7.1 Edited Books

1. C. W. Curtis, A. Dzhamay, W. A. Hereman, and B. Prinari, Editors, *Nonlinear Wave Equations: Analytic and Computational Techniques*, AMS Contemporary Mathematics Series, vol. 635, AMS, Providence, RI, xi + 210 pages (2015). ISBN-13: 978-1-4704-1050-6.

7.2 Special Issues of Journals

1. W. Hereman, Editor, Special Issue on *Continuous and Discrete Integrable Systems with Applications*, Applicable Analysis, **89**, Issue 4, pp. 429-644 (2010). DOI: 10.1080/00036811003731799.

7.3 Contributions in Books

Published

1. W. Hereman and Ü. Göktaş, *Symbolic computation of solitary wave solutions and solitons through homogenization of degree*, in: Nonlinear and Modern Mathematical Physics, Proc. 6th Int. Workshop on Nonlinear and Modern Mathematical Physics (NMMP2022), Springer Proceedings in Mathematics & Statistics, Vol. 459, Eds.: S. Manukure and W.-X. Ma, Springer Verlag, New York (2024), Chapter 4, pp. 101-164. ISBN 978-3-031-59539-4 (eBook), ISBN-13: 978-3-031-59538-7 (print).

2. T. J. Bridgman and W. Hereman, *Lax pairs for edge-constrained Boussinesq systems of partial difference equations*, in: Nonlinear Systems and Their Remarkable Mathematical Structures, Vol. 2, Eds: N. Euler and C. M. Nucci, Chapman and Hall/CRC Press, Boca Raton, Florida (2019), Part A, Chapter A3, pp. 59-88. ISBN-13: 9780367208479 (print).

3. W. Hereman, *The Korteweg-de Vries equation*, in: The Princeton Companion to Applied Mathematics, Ed.: N. Higham *et al*, Princeton University Press, Cambridge, Massachusetts (2015), Part III.16, p. 150. ISBN-13: 978-0-691-15039-0 (print), 978-1-400-87447-7 (e-book).

4. Ü. Göktaş and W. Hereman, *Symbolic computation of conservation laws, generalized symmetries, and recursion operators for nonlinear differential-difference equations*, in: Dynamical Systems and Methods, Eds.: A. C. J. Luo, J. Machado, and D. Baleanu, Springer Verlag, Berlin (2012), Chapter 7, pp. 153-168. DOI 10.1007/978-1-4614-0454-5_7.

5. W. Hereman, P. J. Adams, H. L. Eklund, M. S. Hickman, and B. M. Herbst, *Direct Methods and Symbolic Software for Conservation Laws of Nonlinear Equations*, in: Advances of Nonlinear Waves and Symbolic Computation, Ed.: Z. Yan, Nova Science Publishers, New York (2009), Chapter 2, pp. 19-79. ISBN-10: 1-6069-2260-2, ISBN-13: 978-1-6069-2260-6.

6. W. Hereman, *Shallow water waves and solitary waves*, in: Encyclopedia of Complexity and Systems Science, 11 vols., 10398 p., Ed.: R. A. Meyers, Springer Verlag, Berlin, Germany (2009), Entry 480, pp. 8112-8125.

   Reprinted in: Mathematics of Complexity and Dynamical Systems - Selected entries from the Encyclopedia of Complexity and Systems Science. Ed.: R. A. Meyers, Springer Verlag, Berlin, Germany (2011), Chapter 96, pp. 1520-1532. ISBN-13: 978-1-4614-1805-4 (print), 978-1-4614-1806-1 (e-book), 978-1-4614-1807-8 (print & e-book).

   Updated version of paper appeared in: Solitons – A Volume in the Encyclopedia of Complexity and Systems Science, 2nd ed., Ed.: M. A. Helal, Springer Verlag, New York (2022), pp. 203-220. DOI: 10.1007/978-1-0716-2457-9. ISBN-13: 978-1-0716-2456-2 (print), 978-1-0716-2457-9 (e-book).

7. W. Hereman, M. Colagrosso, R. Sayers, A. Ringler, B. Deconinck, M. Nivala, and M. S. Hickman, *Continuous and Discrete Homotopy Operators and the Computation of Conservation Laws*, in: Differential Equations with Symbolic Computation, Trends in Mathematics, Eds.: D. Wang and Z. Zheng, Birkhäuser Verlag, Basel, Switzerland (2005), Chapter 15, pp. 255-290. DOI: 10.1007/3-7643-7429-2_15. ISBN-10: 3-7643-7368-7, ISBN-13: 978-3-7643-7368-9.

8. W. Hereman, *Painlevé Theory*, in: Computer Algebra Handbook: Foundations, Applications, Systems. Section 2.11.4, Eds.: J. Grabmeier, E. Kaltofen, and V. Weispfenning, Springer Verlag, Berlin, Germany (2002), pp. 99-101. ISBN-13: 978-3-642-55826-9.

9. W. Hereman and Ü. Göktaş, *Integrability Tests for Nonlinear Evolution Equations*, in: Computer Algebra Systems: A Practical Guide, Ed.: M. Wester, Wiley and Sons, New York (1999), Chapter 12, pp. 211-232. ISBN-10: 0-4-719-8353-5, ISBN-13: 978-0-4-719-8353-8.

10. W. Hereman, *Lie symmetry analysis with symbolic software*, in: Encyclopedia of Mathematics, Supplement Volume I, Ed.: M. Hazewinkel, Kluwer Academic Publishers, Dordrecht, The Netherlands (1998), pp. 351-355. ISBN-13: 978-94-015-1288-6.

11. W. Hereman, *Symbolic Software for Lie Symmetry Analysis*, in: CRC Handbook of Lie Group Analysis of Differential Equations, Volume 3: New Trends in Theoretical Developments and Computational Methods, Ed.: N. H. Ibragimov, CRC Press, Boca Raton, Florida (1996), Chapter 13, pp. 367-413. ISBN-13: 978-0-8-493-9419-5, ISBN-10: 0-8-493-9419-8.

12. R. A. Mertens, W. Hereman, and J.-P. Ottoy, *The Raman-Nath equations revisited. II. Oblique incidence of the light – Bragg reflection*, in: Selected Papers on Acousto-optics, Ed.: A. Korpel, SPIE Milestone Series, SPIE Optical Engineering Press, Bellingham, Washington, **MS 16**, pp. 444-448 (1990). ISBN-13: 978-0-8-194-0438-1.

7.4 Featured Book Reviews & Book Reviews

1. W. Hereman, *Review: Involution: The Formal Theory of Differential Equations and its Applications in Computer Algebra*, *By Werner M. Seiler*, Springer-Verlag, New York, 2010, SIAM Review, **53**(3), pp. 589-591 (2011).

2. W. Hereman, *Featured Review: The Mathematica GuideBook for Numerics and the Mathematica GuideBook for Symbolics* By Michael Trott, *Springer-Verlag, New York, 2006*, SIAM Review, **49**(1), pp. 123-129 (2007).

3. W. Hereman, *Featured Review: The Mathematica GuideBook for Programming and the Mathematica GuideBook for Graphics* By Michael Trott, *Springer-Verlag, New York, 2004*, SIAM Review, **47**(4), pp. 801-806 (2005).

7.5 In Refereed Journals

In Preparation

1. F. Verheest, W. Hereman, and C. Olivier, *Gardner equation and acoustic solitary waves in plasmas*, Journal of Plasma Physics, 25 pages (2024).

2. A. M. Grundland, A. J. Hariton, and W. A. Hereman, *Symmetries and links between solutions of the Born-Infeld and Chaplygin equations in* $(2+1)$ *dimensions* (2024).

Published

1. R. Naz and W. Hereman, *Lie symmetries, closed-form solutions, and conservation laws of a constitutive equation modeling stress in elastic materials*, Partial Differential Equations in Applied Mathematics, **13**, Art. No. 101054, 10 pages (2025). DOI: 10.1016/j.padiff.2024.101054.

2. W. Hereman and Ü. Göktaş, *Using symmetries to investigate the complete integrability, solitary wave solutions and solitons of the Gardner equation*, Mathematical and Computational Applications, **29**(5), Art. No. 91, 35 pages (2024). DOI: 10.3390/mca29050091.

3. P. P. Banerjee, M. R. Chatterjee, W. Hereman, D. Mehrl, R. J. Pieper and T.-C. Poon, Adrian Korpel: A Life in Science, Optics & Photonics News, December 2022, pp. 18-20 (2022).

4. F. Verheest and W. Hereman, *Overtaking interaction of two weakly nonlinear acoustic solitons in plasmas at critical compositions*, Journal of Plasma Physics, **85**(1), Art. No. 905850106, 15 pages (2019). DOI: 10.1017/S0022377818001368.

5. S. C. Mancas and W. Hereman, *Traveling wave solutions to fifth- and seventh-order Korteweg-de-Vries equations: Sech and cn solutions*, Journal of the Physical Society of Japan, **87**(11), Art. No. 114002, 8 pages (2018). DOI: 10.7566/JPSJ.87.114002.

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7. F. Verheest, C. P. Olivier, and W. Hereman, *Modified Korteweg-de Vries solitons at supercritical densities in two-electron temperature plasmas*, Journal of Plasma Physics, **82**(2), Art. No. 905820208, 13 pages (2016). DOI: 10.1017/S0022377816000349.

8. T. Bridgman, W. Hereman, G. R. W. Quispel, and P. H. van der Kamp, *Symbolic computation of Lax pairs of systems of partial difference equations using consistency around the cube*, Foundations of Computational Mathematics, **13**(4), pp. 517-544 (2013). DOI: 10.1007/s10208-012-9133-9.

9. F. Verheest, M. A. Hellberg, and W. Hereman, *Head-on collisions of electrostatic solitons in multi-ion plasmas*, Physics of Plasmas, **19**(9), Art. No. 092302, 7 pages (2012). DOI: 10.1063/1.4752217.

10. F. Verheest, M. A. Hellberg, and W. Hereman, *Head-on collisions of electrostatic solitons in nonthermal plasmas*, Physical Review E, **86**(3), Art. No. 036402, 9 pages (2012). DOI: 10.1103/PhysRevE.86.036402.

11. M. Hickman, W. Hereman, J. Larue, and Ü. Göktaş, *Scaling invariant Lax pairs of nonlinear evolution equations*, Applicable Analysis, **91**(2), Alan Jeffrey Memorial Issue, pp. 381-402 (2012). DOI: 10.1080/00036811.2011.629611.

12. D. Poole and W. Hereman, *Symbolic computation of conservation laws for nonlinear partial differential equations in multiple space dimensions*, Journal of Symbolic Computation, **46**(12), pp. 1355-1377 (2011). DOI: 10.1016/j.jsc.2011.08.014.

13. Ü. Göktaş and W. Hereman, *Symbolic computation of recursion operators for nonlinear differential-difference equations*, Mathematical and Computational Applications – An International Journal, **16**(1), pp. 1-12 (2011). DOI: 10.3390/mca16010001.

14. D. Baldwin and W. Hereman, *A symbolic algorithm for computing recursion operators of nonlinear partial differential equations*, International Journal of Computer Mathematics, **87**(5), pp. 1094-1119 (2010). DOI: 10.1080/00207160903111592

15. W. Hereman, *Foreword to the "special issue on continuous and discrete integrable systems with applications"*, Applicable Analysis, **89**(4), pp. 429-431 (2010). DOI: 10.1080/00036811003731799.

16. D. Poole and W. Hereman, *The homotopy operator method for symbolic integration by parts and inversion of divergences with applications*, Applicable Analysis, **89**(4), pp. 433-455 (2010). DOI: 10.1080/00036810903208155.

17. A. M. Grundland, W. A. Hereman, and İ. Yurduşen, *Conformally parametrized surfaces associated with CP^{N-1} sigma models*, Journal of Physics A: Mathematical and Theoretical **41**(6), Article No. 065204, 28 pages (2008). DOI: 10.1088/1751-8113/41/6/065204.

18. W. Hereman, B. Deconinck, and L. D. Poole, *Continuous and discrete homotopy operators: A theoretical approach made concrete*, Mathematics and Computers in Simulation, **74**(4-5), pp. 352-360 (2007). DOI: 10.1016/j.matcom.2006.10.012.

19. D. Baldwin and W. Hereman, *Symbolic software for the Painlevé test of nonlinear ordinary and partial differential equations*, Journal of Nonlinear Mathematical Physics, **13**(1), pp. 90-110 (2006). DOI: 10.2991/jnmp.2006.13.1.8.

20. W. Hereman, *Symbolic computation of conservation laws of nonlinear partial differential equations in multi-dimensions*, International Journal of Quantum Chemistry, **106**(1), pp. 278-299 (2006). DOI: 10.1002/qua.20727.

21. D. Baldwin, Ü. Göktaş, and W. Hereman, *Symbolic computation of hyperbolic tangent solutions for nonlinear differential-difference equations*, Computer Physics Communications, **162**(3), pp. 203-217 (2004). DOI: 10.1016/j.cpc.2004.07.002.

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24. J. DeSanto, G. Erdmann, W. Hereman, and M. Misra, *Application of wavelet transforms for solving integral equations that arise in rough surface scattering*, IEEE Antennas and Propagation Magazine, **43**(6), pp. 55-62 (2001). DOI: 10.1109/74.979497.

25. J. DeSanto, G. Erdmann, W. Hereman, B. Krause, M. Misra, and E. Swim, *Theoretical and computational aspects of scattering from rough surfaces: Two-dimensional transmission surfaces using the spectral-coordinate method*, Waves in Random Media, **11**(4), pp. 489-526 (2001). DOI: 10.1088/0959-7174/11/4/307.

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7.6 In Refereed Conference Proceedings

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8. Ü. Göktaş and W. Hereman, *Invariants and symmetries for partial differential equations and lattices*, Proceedings Fourth International Conference on Mathematical and Numerical Aspects of Wave Propagation, Ed.: J. A. DeSanto, Colorado School of Mines, Golden, Colorado, June 1-5, 1998, SIAM, Philadelphia (1998), pp. 403-407.

9. W. Hereman and W. Zhuang, *Symbolic software for soliton theory*, Proceedings of Conference KdV '95, April 1995, Amsterdam, The Netherlands, Eds.: M. Hazewinkel, H. W. Capel, and E. M. de Jager, Kluwer Academic Publishers, Dordrecht, The Netherlands (1995), pp. 361-378. DOI: 10.1007/978-94-011-0017-5_20.

10. W. Hereman, L. Marchildon, and M. Grundland, *Lie point symmetries of classical field theories*, Proceedings of the XIX International Conference on Group Theoretical Methods in Physics, Salamanca, Spain, June 29-July 4, 1992, Anales de Física. Monografías, vol. 1, Group Theoretical Methods in Physics, vol. 2, Eds.: J. Mateos-Guilarte, M. A. del Olmo, and M. Santander, Real Sociedad Española de Fisica, Ciemat, Barcelona, Spain (1993), pp. 402-405. ISBN-10: 8-4783-4160-9, ISBN-13: 978-8-4783-4160-3.

11. W. Hereman, *SYMMGRP.MAX and other symbolic programs for Lie symmetry analysis of partial differential equations* , in: 'Exploiting Symmetry in Applied and Numerical Analysis', Lectures in Applied Mathematics 29, Proceedings of the AMS-SIAM Summer Seminar, Fort Collins, July 26-August 1, 1992, Eds.: E. Allgower, K. Georg, and R. Miranda, American Mathematical Society, Providence, Rhode Island (1993), pp. 241-257. ISBN-10: 0-8218-1134-7, ISBN-13: 978-0-8218-1134-4.

12. W. Hereman and W. Zhuang, *Symbolic computation of solitons with Macsyma*, Computational and Applied Mathematics II: Differential Equations. Selected and revised papers from the 13th IMACS World Congress, Dublin, July 22-26, 1991, Eds.: W. F. Ames and P. J. van der Houwen, North Holland, Amsterdam, The Netherlands (1992), pp. 287-296. ISBN-10: 0-444-89702-X, ISBN-13: 978-0-444-89702-2.

13. F. Verheest and W. Hereman, *Chaotic pulsations in variable stars with harmonic mode coupling*, Research Reports in Physics, Nonlinear Dynamics, Proceedings of the Conference on Aspects of Nonlinear Dynamics: Solitons and Chaos, Free University of Brussels, Brussels, Belgium, December 6-8, 1990, Eds.: I. Antoniou and F. J. Lambert, Springer Verlag, Berlin, Germany (1991), pp. 166-170. DOI: 10.1007/978-3-642-84570-3_20.

14. R. A. Mertens, W. Hereman, and J.-P. Ottoy, *The N-th order approximation method in acousto-optics and the condition for 'pure' Bragg reflection*, Proceedings of the Symposium on *Physical Acoustics: Fundamentals and Applications.* University of Leuven at Kortrijk, Kortrijk, Belgium, June 19-22, 1990, Eds.: O. Leroy and M. A. Breazeale, Plenum Press, New York (1991), pp. 505-509. ISBN-10: 0-306-43883-6, ISBN-13: 9-780-306-43883-7.

15. W. Hereman and W. Zhuang, *A MACSYMA program for the Hirota method*, Proceedings of the 13th IMACS World Congress on Computation and Applied Mathematics, Dublin, July 22-26, 1991, Eds.: R. Vichnevetsky and J. J. H. Miller, Criterion Press, Dublin, Ireland (1991), vol. 2, pp. 842-843.

16. W. Hereman, *Application of a Macsyma program for the Painlevé test to the Fitzhugh-Nagumo equation*, *Partially Integrable Evolution Equations in Physics*, Proceedings of the Summer School for Theoretical Physics, Les Houches, France, March 21-28, 1989, Eds.: R. Conte and N. Boccara, Kluwer Academic Publishers, Dordrecht, The Netherlands (1990), Contributed Papers, pp. 585-586. ISBN-10: 0-7923-0752-6, ISBN-13: 978-0-7923-0752-5.

17. W. Hereman and E. Van den Bulck, *MACSYMA program for the Painlevé test of nonlinear ordinary and partial differential equations*, Proceedings of the Workshop on Finite Dimensional Integrable Nonlinear Dynamical Systems, Eds.: P. G. L. Leach and W.-H. Steeb, Johannesburg, South Africa, January 11-15, 1988. World Scientific Publishing Co., River Edge, New Jersey (1988), pp. 117-129. ISBN-10: 9-9715-0541-X, ISBN-13: 978-9-9715-0541-7.

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19. R. A. Mertens, W. Hereman, and J.-P. Ottoy, *The Raman-Nath equations revisited. II. Oblique incidence of the light – Bragg reflection*, Proceedings Ultrasonics International '87, London, July 6-9, 1987, Butterworth & Co., Oxford, United Kingdom (1987), pp. 84-89. ISBN-10: 0-408-02348-1.

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22. R. A. Mertens and W. Hereman, *On the diffraction of light by adjacent parallel ultrasonic waves. A general theory*, Proceedings Ultrasonics International '83, Ed.: S. Stuart, Halifax, Canada, July 12-14, 1983, Butterworth & Co., Guildford, United Kingdom (1983), pp. 282-288. ISBN-10: 0-408-22163-1, ISBN-13: 978-0-408-22163-4.

23. W. Hereman, *Acousto-optic diffraction of intense laser light in an isotropic medium (including third harmonic generation)*, Proceedings of the Second Spring School on Acousto-optics and Applications, Gdańsk, Poland, May 24-29, 1983, pp. 206-223.

24. R. A. Mertens and W. Hereman, *Diffraction of light by ultrasonic waves in the case of oblique incidence of the light. General theory and approximations*, Proceedings of the Second Spring School on Acousto-optics and Applications, Gdańsk, Poland, May 24-29, 1983, pp. 9-31.

25. W. Hereman and R. A. Mertens, *On the diffraction of light by ultrasonic waves in the Bragg case*, Revue d'Acoustique, 11th International Congress on Acoustics, Paris, France, July 19-27, 1983, vol. 2, pp. 287-290.

26. W. Hereman, F. Verheest, and R. A. Mertens, *On the Acousto-optics of an intense laser beam in a liquid*, Proceedings Ultrasonics International '81, Brighton, United Kingdom, June 30-July 2, 1981, Eds: Z. Novak, S. L. Bailey, IPC Business Press, Guildford, United Kingdom (1981), pp. 104-109. ISBN-10: 0-861-0-3054-0, ISBN-13: 978-0-861-0-3054-5.

27. R. A. Mertens, W. Hereman, and F. Verheest, *Some recent developments in the theory of diffraction of light by ultrasonic waves*, Proceedings of the First Spring School on Acousto-optics and Applications, Gdańsk, Poland, May 26-30, 1980, pp. 33-51.

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29. R. A. Mertens and W. Hereman, *Über die Raman-Nathsche Theorie der Beugung des Lichtes an Ultraschallwellen*, Fortschritte der Akustik DAGA '80, München, Germany, March 10-13, 1980, VDE-Verlag, Deutsche Gesellshaft für Akustik (DEGA), Berlin, Germany (1980), pp. 563-566. ISBN-10: 3-9804568-7-0.

7.7 In Unrefereed Conference Proceedings

1. W. Hereman and A. Nuseir, *Symbolic methods to find exact solutions of nonlinear PDEs*, Proceedings of the 14th IMACS World Congress on Computational and Applied Mathematics, Atlanta, Georgia, July 11-15, 1994, Ed.: W. F. Ames, IMACS, New Brunswick, Georgia Institute of Technology, Atlanta (1994), vol. 1, pp. 222-225.

2. W. Hereman, *Symbolic software for the study of nonlinear partial differential equations* , in: Advances in Computer Methods for Partial Differential Equations VII, Proceedings of the 7th IMACS International Conference on Computer Methods for Partial Differential Equations, Rutgers University, New Brunswick, New Jersey, June 22-24, 1992, Eds.: R. Vichnevetsky, D. Knight, and G. Richter, IMACS, New Brunswick, New Jersey (1993), pp. 326-332. ISBN-10: 9-9930-4427-X, ISBN-13: 978-9993-04427-7

3. W. Hereman, *Solitary wave solutions of coupled nonlinear evolution equations using Macsyma*, Proceedings of IMACS 1st International Conference on Computational Physics, Eds.: K. Gustafson and W. Wyss, University of Colorado, Boulder, Colorado, June 11-15, 1990, pp. 150-153.

4. R. A. Mertens, W. Hereman, F. Verheest, and J.-P. Ottoy, *Theoretical acousto-optics: exact, approximate and numerical methods*, Book of Abstracts, Proceedings of Workshop V on (nonlinear) stability, University of Antwerp, Antwerp, Belgium, September 11-23, 1990, Ed.: D. K. Callebaut, UIA Press, Antwerp, Belgium (1990), pp. 45-50.

5. W. Hereman, *The construction of implicit and explicit solitary wave solutions of nonlinear partial differential equations*, Proceedings of the Conference on Applied Mathematics in Honor of Prof. A. A. Ashour, 3-6 January, 1987, Cairo, Egypt (1988), pp. 291-312.

6. W. Hereman, P. P. Banerjee, and D. Faker, *The construction of solitary wave solutions of the Korteweg-de Vries equation via Painlevé analysis*, Proceedings of Workshop WASDA III: Wave and Soliton Days Antwerp, University of Antwerp, June 2-3, 1988, Eds.: D. K. Callebaut and W. Malfliet, UIA Press, Antwerp, Belgium (1988), vol. II, pp. 166-191.

7. P. P. Banerjee, W. Choe, G. Cao, and W. Hereman, *Stationary eigenmodes and their stability during wave propagation in a medium with quadratic and cubic nonlinearities without dispersion*, Proceedings of Workshop WASDA III: Wave and Soliton Days Antwerp, Antwerp, Belgium, June 2-3,1988, Eds.: D. K. Callebaut and W. Malfliet, UIA Press, Antwerp, Belgium (1988), vol. II, pp. 143-165.

8. F. Verheest and W. Hereman, *Wave decoupling for the Sharma-Tasso-Olver and higher-order Korteweg-de Vries equations*, Proceedings of Workshop II on (nonlinear) Stability in Magneto-hydro-dynamics, University of Antwerp, Antwerp, Belgium, September 1-30, 1980, Ed.: D. K. Callebaut, UIA Press, Antwerp, Belgium (1980), pp. 125-137.

7.8 Technical Reports

1. J. DeSanto, G. Erdmann, W. Hereman, B. Krause, M. Misra, and E. Swim, *Theoretical and computational aspects of scattering from rough surfaces: Two-dimensional surfaces*, Technical Report # 4 MURI Project, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado (2000), 183 pages.

2. J. DeSanto, G. Erdmann, W. Hereman, and M. Misra, *Theoretical and computational aspects of scattering from rough surfaces: One-dimensional transmission interface*, Technical Report # 3 MURI Project, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado (2000), 121 pages.

3. J. DeSanto, G. Erdmann, W. Hereman, and M. Misra, *Theoretical and computational aspects of scattering from rough surfaces: One-dimensional perfectly reflecting surfaces*, Technical Report # 2 MURI Project, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado (1997), 62 pages.

4. J. Boleng, C. Craig, J. DeSanto, G. Erdmann, W. Hereman, M. Khebchareon, M. Misra, and A. Sinex, *Computational modeling of rough surface scattering*, Technical Report # 1 MURI Project, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado (1996), 40 pages.

5. W. Murphy and W. Hereman, *Determination of a position in three dimensions using trilateration and approximate distances*, Technical Report MCS-95-07, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado (1995), 19 pages.

6. W. Hereman and W. Murphy, *Manual for trilateration program: Determination of a position in three dimensions using trilateration and approximate distances*, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado (1991), 22 pages.

7. W. Hereman and W. Zhuang, *Symbolic computation of solitons via Hirota's bilinear method*, Technical Report, Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado (1994), 33 pages.

8. W. Hereman, Y. Nagel, and J. Strikwerda, *Macsyma at CMS version 309.3: An introduction to symbolic mathematical computation*, CMS Technical Summary Report # 88-3, Department of Mathematics & Center for the Mathematical Sciences, The University of Wisconsin, Madison, Wisconsin (1987), 21 pages.

7.9 Theses

1. W. Hereman, *Theoretische Aspecten van Akoesto-Optische Diffractie (Theoretical Aspects of Acousto-optical Diffraction)*, Ph.D. Dissertation, University of Ghent, Ghent, Belgium, June 1982, 247 pages, 5 figures, in Dutch.

2. W. Hereman, *Asymtotische Storingsmethodes in de Studie van Niet-lineaire Resonanties (The Krylov-Bugoliubov-Mitropolski Method and the Two-Timescales Averaging Method for the Study of Nonlinear Dynamical Resonances)*, Master of Science Thesis, University of Ghent, Ghent, Belgium, June 1976, 215 pages, in Dutch.

7.10 Research Monographs

1. W. Hereman, *Theoretische Aspecten van Akoesto-Optische Diffractie (Theoretical Aspects of Acousto-optical Diffraction)*, Research Monograph, prepared for the Royal Academy of Sciences, Literature and Fine Arts of Belgium; University of Ghent, Ghent, Belgium (1985), 260 pages, 5 figures, in Dutch.

2. W. Hereman, *Een Bijdrage tot de Theoretische Studie van de Diffractie van Gewoon en Laserlicht door een Ultrageluidsgolf in een Vloeistof*, Thesis written for a Contest of the Royal Academy of Sciences, Literature and Fine Arts of Belgium; University of Ghent, Ghent, Belgium (1984), 143 pages, in Dutch.

7.11 Scientific Software Packages

Synopsis: 27 software packages (including some updates) mainly for Mathematica (commercial software), some for Macsyma (commercial software, now obsolete). The Macsyma program *symmgpr.max* for Lie-point symmetries of differential equations has been adapted to Maxima (i.e., DOE-Macsyma, a free computer algebra system in the public domain).

1. Ü. Göktaş and W. Hereman, **PDESolitonSolutions.m**: A Mathematica program for the symbolic computation of solitary wave and soliton solutions of polynomial nonlinear PDEs using a simplified version of Hirota's method (2023).
   Available at URL : http : //inside.mines.edu/∼whereman/software/PDESolitonSolutions.

2. A. Cook, W. Hereman, and Ü. Göktaş, **Homogenize-And-Solve.m**: A Mathematica program for the symbolic computation of solitary wave and soliton solutions of some scalar nonlinear evolution equations with polynomial terms (2012).
   Available at URL : http : //inside.mines.edu/∼whereman/software/Homogenize−And−Solve.

3. T. J. Bridgman and W. Hereman, **LaxPairPartialDifferenceEquations.m**: A Mathematica program for the symbolic computation of Lax pairs of systems of nonlinear partial difference equations defined on quadrilaterals (2012-2017).
Available at URL : http : //inside.mines.edu/∼whereman/software/LaxPairPartialDifferenceEquations.

4. Ü. Göktaş and W. Hereman, **DDERecursionOperator.m**: A Mathematica package for the symbolic computation of recursion operators of systems of nonlinear differential-difference equations (2010).
Available at URL : http : //inside.mines.edu/∼whereman/software/DDERecursionOperator.

5. W. Hereman, **symmgrp2020.max**: A Maxima program for the calculation of Lie point symmetries of large systems of differential equations (2020). The package symmgrp2020.max is an update of symmgrp2009.max and works under Maxima (a.k.a. DOE-Macsyma), a computer algebra system which can be freely downloaded from SourceForge.
Available at URL : http : //inside.mines.edu/∼whereman/software/symmetry/symmgrp2020.

6. W. Hereman and Benoit Huard, **symmgrp2009.max**: A Macsyma/Maxima program for the calculation of Lie point symmetries of large systems of differential equations (2009).
Available at URL : http : //inside.mines.edu/∼whereman/software/symmetry/symmgrp2009.

7. L. D. Poole and W. Hereman, **ConservationLawsMD.m**: A Mathematica package for the symbolic computation of conservation laws of systems of nonlinear partial differential equations in multiple space dimensions (2009).
Available at URL : http : //inside.mines.edu/∼whereman/software/ConservationLawsMD.

8. W. Hereman, **LaxPairLattices.m**: A Mathematica program for the symbolic computation of Lax pairs of two-dimensional nonlinear partial difference equations (2007-2009). Joint work with Reinout Quispel and Peter van der Kamp.
Available at URL : http : //inside.mines.edu/∼whereman/software/LaxPairLattices.

9. L. D. Poole and W. Hereman, **HomotopyIntegrator.m**: A Mathematica package for the application of the homotopy method for (i) integration by parts of expressions involving unspecified functions of one variable and (ii) the inversion of a total divergence involving unspecified functions of two or three independent variables (2006-2009).
Available at URL : http : //inside.mines.edu/∼whereman/software/HomotopyIntegrator.

10. D. Baldwin and W. Hereman, **PDERecursionOperator.m**: A Mathematica package for the symbolic computation of recursion operators of systems of nonlinear partial differential equations (2004-2009).
Available at URL : http : //inside.mines.edu/∼whereman/software/PDERecursionOperator.

11. J. Blevins, J. Heath, and W. Hereman, **PDESolutionTester.m**: A Mathematica program for the symbolic verification of exact solutions of nonlinear partial differential equations (2002).
Available at URL : http : //inside.mines.edu/∼whereman/software/PDESolutionTester.

12. P. J. Adams and W. Hereman, **TransPDEDensityFlux.m**: A Mathematica package for the symbolic computation of conserved densities and fluxes for systems of partial differential equations with transcendental nonlinearities (2002).
Available at URL : http : //inside.mines.edu/∼whereman/software/TransPDEDensityFlux.

13. H. Eklund and W. Hereman, **DDEDensityFlux.m**: A Mathematica package for the symbolic computation of conserved densities and fluxes of nonlinear systems of differential-difference equations (2002).
Available at URL : http : //inside.mines.edu/∼whereman/software/DDEDensityFlux.

14. W. Hereman and R. Kragler, **PDESpecialSolutionsV4-Jul4-2020.m**: A Mathematica package for the symbolic computation of exact solutions expressible in hyperbolic and elliptic functions for systems of nonlinear partial differential equations (July 4, 2020).
Available at URL : http : //inside.mines.edu/∼whereman/software/PDESpecialSolutions.

15. D. Baldwin, Ü. Göktaş, W. Hereman, L. Hong, R. Martino, and J. C. Miller, **PDESpecialSolutions.m**: A Mathematica package for the symbolic computation of exact solutions expressible in hyperbolic and elliptic functions for systems of nonlinear partial differential equations (2002-2010).
Available at URL : http : //inside.mines.edu/∼whereman/software/PDESpecialSolutions.

16. D. Baldwin, Ü. Göktaş, and W. Hereman, **DDESpecialSolutions.m**: A Mathematica package for the symbolic computation of tanh solutions for systems of nonlinear differential-difference equations (2002-2010).
    Available at URL : http : //inside.mines.edu/∼whereman/software/DDESpecialSolutions.
    Program with manual were added to the Computer Physics Communications Program Library, Queen's University of Belfast, North Ireland (2002).

17. D. Baldwin and W. Hereman, **PainleveTest.m**: A Mathematica package for the Painlevé test of systems of nonlinear ordinary and partial differential equations (2001-2006).
    Available at URL : http : //inside.mines.edu/∼whereman/software/painleve/mathematica.

18. Ü. Göktaş and W. Hereman, **InvariantsSymmetries.m**: A Mathematica integrability package for the computation of invariants and symmetries of systems of nonlinear partial differential equations and nonlinear differential-difference equations (1997-2009).
    Available from the Wolfram Research Library Archive at
    URL: http://library.wolfram.com/infocenter/MathSource/570.
    Also available on the Internet at URL : http : //inside.mines.edu/∼whereman/software/invarsym.

19. Ü. Göktaş and W. Hereman, **DIFFDENS.M**: A Mathematica program for the symbolic computation of conserved densities for systems of nonlinear differential-difference equations (1997).
    Available at URL : http : //inside.mines.edu/∼whereman/software/diffdens.

20. Ü. Göktaş and W. Hereman, **CONDENS.M**: A Mathematica program for the symbolic computation of conserved densities for systems of nonlinear evolution equations (1996).
    Available at URL : http : //inside.mines.edu/∼whereman/software/condens.

21. Ü. Göktaş and W. Hereman, **PAINSYS.MAX**: A Macsyma program for the Painlevé test of nonlinear systems of ordinary and partial differential equations (1995).
    Available at URL : http : //inside.mines.edu∼/whereman/software/painleve/macsyma/system.

22. W. Hereman and A. Miller, **PAINMATH.M**: A Mathematica program for the Painlevé test of single nonlinear ordinary and partial differential equations (1995).

23. W. Hereman and W. Zhuang, **hirota.m**: A Mathematica program for the calculation of soliton solutions of certain nonlinear partial differential equations via Hirota's bilinear method (1994-1995, 2007).
    Available at URL : http : //inside.mines.edu/∼whereman/software/hirota/mathematica.

24. W. Hereman and W. Zhuang, **HIROTA.MAX**: A Macsyma program for the calculation of soliton solutions of certain nonlinear partial differential equations via Hirota's bilinear method (1994-1995).
    Available at URL : http : //inside.mines.edu/∼whereman/software/hirota/macsyma.

25. B. Champagne, W. Hereman, and P. Winternitz **symmgrp.max**: A Macsyma program for the calculation of Lie point symmetries of large systems of differential equations (1991-2006).
    Available at URL : http : //inside.mines.edu/∼whereman/software/symmetry/symmgrp2006.
    Program symmgrp.max with manual were added to the Computer Physics Communications Program Library, Queen's University of Belfast, North Ireland (1991).

26. W. Hereman and W. Murphy, **Trilater.c**: A proprietary C++ program for determining positions based on trilateration. Program and manual were used in the "Bulldozer Project" by Thunder Basin Coal Company, Wright, Wyoming (1991).

27. W. Hereman, **PAINSING.MAX**: A Macsyma program for the Painlevé test of single ordinary and partial differential equations.
    Available at URL : http : //inside.mines.edu∼/whereman/software/painleve/macsyma/single.
    Program appeared in *Finite Dimensional Integrable Nonlinear Dynamical Systems*, Eds.: P. G. L. Leach, and W.-H. Steeb, World Scientific Publishing Co., River Edge, New Jersey (1988).
    The program was featured in the Macsyma Newsletter, **6**, January 1989, Macsyma, Inc., Arlington, Massachusetts (1989).

8 Presentations

Synopsis: 60 plenary or invited lectures at conferences and workshops, 49 presentations at conferences and workshops, 84 invited colloquium talks and seminars at universities and laboratories, 54 colloquium talks and seminars at local universities, and 34 participation in conferences and workshops.

8.1 Plenary or Invited Lectures at Conferences and Workshops

1. Talk and software demonstration: W. Hereman, *Symbolic computation of conservation laws of nonlinear partial differential equations*, Workshop and Academic Salon "Beyond Symbolic Computation and Applied Mathematics," Zhejiang Normal University, *Zhejiang, China*, virtual, December 16, 2022.

2. Plenary talk: W. Hereman, *A simplified Hirota method: Computation of solitary wave solutions and solitons through homogenization of degree*, 6th International Workshop on Nonlinear and Modern Mathematical Physics (NMMP2022), virtual, Florida Agricultural and Mechanical University, *Tallahassee, Florida*, virtual, June 17-19, 2022.

3. Talk and software demonstration: W. Hereman, *Continuous and discrete homotopy operators with applications*, Conference on "Symmetry and Computation," Centre International des Rencontres Mathématiques (CIRM), Luminy, Marseille, France, April 3-7, 2018.

4. Talk and software demonstration: Ü. Göktaş and W. Hereman, *Application of the simplified Hirota (homogenization) method to a (3+1)-dimensional evolution equation for deriving multiple soliton solutions*, Special Session on Analytical and Computational Techniques for Differential and Difference Equations, Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia, April 1-3, 2015. [Presented by Ü. Göktaş].

5. Talk: W. Hereman, *Application of the Euler and homotopy operators to integrability testing*, Special Session on Analytical and Computational Techniques for Differential and Difference Equations, Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia, April 1-3, 2015.

6. Talk and software demonstration: W. Hereman, *Symbolic computation of conservation laws of nonlinear partial differential equations*, 30th International Colloquium on Group Theoretical Methods in Physics (Group 30), University of Ghent, *Ghent, Belgium*, July 18, 2014.

7. Talk and software demonstration: W. Hereman, *Symbolic computation of conservation laws of nonlinear partial differential equations*, 2014 International Conference and 38th South African Symposium on Numerical and Applied Mathematics (SANUM 2014), University of the Witwatersrand, *Johannesburg, South Africa*, April 16, 2014.

8. Talk: W. Hereman and T. Bridgman, *Symbolic computation of Lax pairs of systems of partial difference equations using consistency around the cube*, Minisymposium on Computational Aspects of Moving Frames, 2013 SIAM Conference on Applied Algebraic Geometry, Colorado State University, *Fort Collins, Colorado*, August 1-4, 2013.

9. Talk: W. Hereman and T. Bridgman, *Symbolic computation of Lax pairs of systems of partial difference equations using consistency around the cube*, Special Session on Nonlinear Waves and Integrable Systems, AMS Spring Western Sectional Meeting, University of Colorado–Boulder, *Boulder, Colorado*, April 13-14, 2013.

10. Talk: W. Hereman and T. Bridgman, *Symbolic computation of Lax pairs of systems of partial difference equations using consistency around the cube*, Special Session on Symbolic and Numerical Aspects of Nonlinear Differential and Difference Equations, Eight IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, March 25-28, 2013.

11. Talk and software demonstration: Ü. Göktaş, W. Hereman, and A. Cook, *Symbolic computation of soliton solutions of PDEs through homogenization*, Special Session on Symbolic and Numerical Aspects of Nonlinear Differential and Difference Equations, Eight IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, March 25-28, 2013. [Presented by Ü. Göktaş].

12. Talk and software demonstration: J. Rezac and W. Hereman, *A symbolic algorithm to compute Lax pairs in matrix form for nonlinear evolution equations*, Special Session on Symbolic and Numerical Aspects of Nonlinear Differential and Difference Equations, Eight IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, March 25-28, 2013. [Presented by J. Rezac].

13. Talk: W. Hereman and T. Bridgman, *Symbolic computation of Lax pairs of integrable nonlinear partial difference equations*, Workshop on Nonlinear Evolution Equations and Dynamical Systems (NEEDS 2012), Orthodox Academy of Crete (OAC), *Kolymbari, Crete*, July 12, 2012.

14. Talk: W. Hereman, M. Hickman, Ü. Göktaş, and J. Larue, *Symbolic computation of scaling invariant Lax pairs in operator form for integrable systems*, 2012 SIAM Conference on Nonlinear Waves and Coherent Structures, University of Washington, *Seattle, Washington*, June 15, 2012.

15. Talk and software demonstration: J. Rezac and W. Hereman, *Construction of Lax pairs in matrix form and the Drinfel'd-Sokolov method for conservation laws*, 2012 SIAM Conference on Nonlinear Waves and Coherent Structures, University of Washington, *Seattle, Washington*, June 15, 2012. [Presented by J. Rezac].

16. Talk and software demonstration: W. Hereman and D. Poole, *Symbolic computation of conservation laws of nonlinear PDEs with applications*, Seventh International Congress on Industrial and Applied Mathematics, ICIAM 2011, *Vancouver, Canada*, July 22, 2011.

17. Talk and software demonstration: W. Hereman and T. Bridgman, *Symbolic computation of Lax pairs of integrable nonlinear partial difference equations on quad-graphs*, Workshop on "Symbolic Analysis", Conference on Foundations of Computational Mathematics (FoCM'11), *Budapest, Hungary*, July 14, 2011.

18. Talk and software demonstration: W. Hereman and T. Bridgman, *Symbolic computation of Lax pairs of integrable nonlinear partial difference equations on quad-graphs*, Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, April 6, 2011.

19. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations in multiple space dimensions*, First International Conference on Symmetry Plus Integrability (SPI 2010). In Honor of Prof. Yuji Kodama's 60th Birthday, *South Padre Island, Texas*, June 14, 2010.

20. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations in multiple space dimensions*, Special Session on Geometric Flows, Moving Frames and Integrable Systems, 2010 Spring Central Sectional Meeting of the American Mathematical Society, Macalester College, *St. Paul, Minnesota*, April 10, 2010.

21. Talk and software demonstration: *Symbolic Computation of Lax Pairs of Integrable Nonlinear Difference Equations on Quad-graphs*, Workshop on Discrete Systems and Special Functions, part of the special semester program on "Discrete Integrable Systems", Isaac Newton Institute for Mathematical Sciences, *Cambridge, U.K.*, June 29, 2009. [Lecture available in various video formats from *Streaming Media Service*, University of Cambridge, U.K.].

22. Talk and software demonstration: *Symbolic computation of Lax pairs of two-dimensional nonlinear partial difference equations*, Special Session on Recent Advances in Symbolic Algebra and Analysis, 2009 Spring Southeastern Meeting of the American Mathematical Society, Department of Mathematics, North Carolina State University, *Raleigh, North Carolina*, April 5, 2009.

23. Keynote address: *Symmetry anyone?*, 2008 International Conference and South African Symposium for Numerical and Applied Mathematics (SANUM 2008), Stellenbosch University, *Stellenbosch, Matieland, South Africa*, March 27, 2008.

24. Plenary talk: *Symbolic computation of conservation laws of nonlinear PDEs in $N+1$ dimensions*, 2008 International Conference and South African Symposium for Numerical and Applied Mathematics (SANUM 2008), Stellenbosch University, *Stellenbosch, Matieland, South Africa*, March 26, 2008.

25. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs in multi-dimensions*, 2006 SIAM Conference on Nonlinear Waves and Coherent Structures, University of Washington, *Seattle, Washington*, September 10, 2006.

26. Talk and software demonstration: *Symbolic computation of conservation laws of PDEs in* $(3 + 1)$*-dimensions*, International Conference on Nonlinear Waves, Integrable Systems and Applications (in Honor of Mark Ablowitz 60th Birthday), *Colorado Springs, Colorado*, June 4-8, 2005.

27. Talk and software demonstration: *Continuous and discrete homotopy operators: a theoretical approach made concrete*, Session on Symbolic and Numerical Computation for Differential Equations, Fourth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, April 11-14, 2005.

28. Talk: M. Hickman and W. Hereman, *Computation of densities and fluxes of nonlinear differential-difference equations*, Sixth Asian Symposium on Computer Mathematics, *Beijing, China*, October 23-25, 2003 [Presented by M. Hickman].

29. Talk: *Continuous and discrete homotopy operators with applications in integrability testing*, Session on Nonlinear Waves V, AMS Fall Western Sectional Meeting, University of Colorado–Boulder, *Boulder, Colorado*, October 2-4, 2003.

30. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear differential-difference equations*, Workshop on Group Theory and Numerical Analysis, Centre de Recherches Mathématiques, Université de Montréal, *Montréal, Québec, Canada*, May 26-31, 2003.

31. Talk and software demonstration: *Symbolic integrability tests for nonlinear partial differential and differential-difference equations*, Fifth International Congress on Industrial and Applied Mathematics, ICIAM 2003, *Sydney, Australia*, July 7-11, 2003.

32. Talk: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Workshop on 'Computer Algebra in Applications to Integrable Systems', Isaac Newton Institute for Mathematical Sciences, *Cambridge, U.K.*, November 16-17, 2001.

33. Talk: *Conserved densities and generalized symmetries of nonlinear differential-difference equations*, Nonlinear Evolution Equations and Dynamical Systems (NEEDS), Isaac Newton Institute for Mathematical Sciences, *Cambridge, U.K.*, July 24-31, 2001.

34. Plenary talk: *Solving nonlinear wave equations and lattices with Mathematica*, 2001 International Conference and South African Symposium for Numerical and Applied Mathematics (SANUM 2001), Stellenbosch University, *Stellenbosch, Matieland, South Africa*, April 11, 2001.

35. Lecture series: *Wavelets: theory and applications* (10 lectures), Ph.D. Program DOCOP, Department of Physics, University of Antwerp, *Antwerp, Belgium*, December 4-22, 2000.

36. Talk: *Exact solutions of nonlinear partial differential equations with the tanh/sech method*, Scholars in Residence Program, Wolfram Research, Inc., *Champaign, Illinois*, November 3, 2000.

37. Talk: *A symbolic algorithm to compute conservation laws of nonlinear evolution equations*, Session on Integrability of Evolution Equations, IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, April 12-15, 1999.

38. Talk: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Workshop on Symbolic Computation in Geometry and Analysis, Mathematical Sciences Research Institute (MSRI), *Berkeley, California*, October 12-16, 1998.

39. Talk: *Symbolic computation of conservation laws for nonlinear PDEs and differential-difference equations*, Session on Applications of Symbolic Computation to Differential Equations, Regional AMS Meeting, *Atlanta, Georgia*, October 17-19, 1997.

40. Talk: *Symbolic computation of conservation laws for nonlinear PDEs and differential-difference equations*, 11th Workshop on Nonlinear Evolution Equations and Dynamical Systems (NEEDS), Orthodox Academy of Crete (OAK), *Kolymbari, Crete*, June 18-28, 1997.

41. Talk: *Symbolic computation of conserved densities for systems of nonlinear evolution equations*, Workshop on Lie Symmetry Software with Applications to Nonlinear Problems, International Sophus Lie Center (ISLC), *Nordfjordeid, Norway*, June 24, 1996.

42. Talk and software demonstration: *Symbolic software for Lie symmetry computations*, Workshop on Lie Symmetry Software with Applications to Nonlinear Problems, International Sophus Lie Center (ISLC), *Nordfjordeid, Norway*, June 18, 1996.

43. Talk: *Wavelets: concepts and applications*, Mathematical Physics Days, Catholic University of Leuven, *Leuven, Belgium*, May 21, 1996.

44. Lecture series: *Wavelets: an introduction to theory and applications* (8 lectures), Ph.D. Program DOCOP, Department of Physics, University of Antwerp, *Antwerp, Belgium*, May 13-16, 1996.

45. Talk: *Symbolic software for soliton theory: integrability, symmetries, conservation laws and exact solutions*, Symposium in Applied Mathematics: Nonlinear Waves, Dynamics, Asymptotic Analysis and Physical Applications, in honor of 70th birthday of Martin D. Kruskal, University of Colorado, *Boulder, Colorado*, August 3-6, 1995.

46. Talk: *Symbolic software for nonlinear PDEs: integrability, symmetries and exact solutions*, Nonlinear Dynamical Systems Workshop, Research Institute for Applications of Computer Algebra (RIACA), *Amsterdam, The Netherlands*, June 18-23, 1995.

47. Talk: *Symbolic computation of conserved densities*, IMACS Conference on Applications of Computer Algebra, University of New Mexico, *Albuquerque, New Mexico*, May 16-20, 1995.

48. Talk and software demonstration: *Symbolic software for soliton theory*, KdV '95, International Symposium, *Amsterdam, The Netherlands*, April 23-16, 1995.

49. Talk: *Symbolic methods to find exact solutions of nonlinear PDEs*, 14th IMACS World Congress on Computation and Applied Mathematics, *Atlanta, Georgia*, July 11-15, 1994.

50. Lecture series: *Wavelets: theory and applications* (3 lectures), Division of Mathematical Physics and Astronomy, University of Ghent, *Ghent, Belgium*, November 25, December 2 and 9, 1993.

51. Talk: *Symbolic software for the study of nonlinear partial differential equations*, Seventh IMACS International Conference on Computer Methods for Partial Differential Equations, Rutgers University, *New Brunswick, New Jersey*, June 22-24, 1992.

52. Talk: *Review of symbolic software for calculating Lie symmetries of PDEs*, Seventh IMACS International Conference on Computer Methods for Partial Differential Equations, Rutgers University, *New Brunswick, New Jersey*, June 22-24, 1992.

53. Talk: *Symbolic computation of exact solutions of nonlinear wave equations*, Symposium "The Rocky Mountain Nonlinear Experience", University of Colorado, *Boulder, Colorado*, August 12-13, 1991.

54. Talk: *Exact solitary waves solutions to nonlinear evolution and wave equations using MACSYMA*, IMACS First International Conference on Computational Physics, University of Colorado, *Boulder, Colorado*, June 11-15, 1990.

55. Talk: *Direct methods to construct solitary wave solutions*, Workshop WASDA III: Wave and Soliton Days Antwerp, University of Antwerp, *Antwerp, Belgium*, June 2-3, 1988.

56. Talk and software demonstration: *Demonstration on use of MACSYMA in applied mathematics*, MIPAC Workshop, University of Wisconsin, *Madison, Wisconsin*, May 16-18, 1988.

57. Talk and software demonstration: *MACSYMA program for the Painlevé test of non-linear ordinary and partial differential equations*, Workshop on Finite Dimensional Integrable Nonlinear Dynamical Systems, University of the Witwatersrand, *Johannesburg, South Africa*, January 11-15, 1988.

58. Talk: *The construction of implicit and explicit solitary wave solutions of non-linear partial differential equations*, Conference on Applied Mathematics in the Honor of Prof. A. Ashour, Giza, *Cairo, Egypt*, January 3-6, 1987.

59. Talk: *Exact solitary wave solutions of non linear evolution and wave equations using a direct algebraic method*, Workshop WASDA II: Wave and Soliton Days Antwerp, University of Antwerp, *Antwerp, Belgium*, June 28, 1985.

60. Talk: *Theoretical aspects of acousto-optical diffraction: acousto-optical diffraction of intense laser light in an isotropic medium (including third harmonic generation)*, Second Spring School on Acousto-Optics and Applications, *Gdansk, Poland*, May 24-29, 1983.

8.2 Presentations at Conferences and Workshops

1. Talk and software demonstration: W. Hereman, *Symbolic computation of conservation laws of nonlinear partial differential equations*, Winter meeting Canadian Mathematical Society, Richmond, British Columbia, Canada, Nov. 29-Dec. 2, 2024. [Presented on Zoom: Dec. 2, 2024].

2. Poster: F. Verheest and W. Hereman, *Gardner equation for solitary waves in multispecies plasmas*, 21st International Congress on Plasma Physics (ICPP 2024), Ghent, Belgium, September 10, 2024. [Presented by F. Verheest].

3. Talk: W. Hereman, *Using symmetries to investigate the complete integrability of nonlinear PDEs and differential-difference equations*, Colorado Nonlinear Days, University of Colorado–Colorado Springs, *Colorado Springs, Colorado*, April 30, 2023.

4. Talk: W. Hereman, *A simplified Hirota method: Computation of solitary wave solutions and solitons through homogenization of degree*, Colorado Nonlinear Days, University of Colorado–Colorado Springs, *Colorado Springs, Colorado*, April 24, 2022.

5. Poster: F. Verheest and W. Hereman, *Overtaking interaction of two weakly nonlinear acoustic solitons in plasmas at critical densities*, 18th International Congress on Plasma Physics (ICPP 2018), Vancouver, Canada, June 4-8, 2018. [Presented by F. Verheest].

6. Talk: W. Hereman, *Gauge equivalence of Lax pairs of nonlinear partial difference equations*, Third Colorado Nonlinear Days, University of Colorado–Colorado Springs, *Colorado Springs, Colorado*, November 12, 2017.

7. Poster: F. Verheest, C. P. Olivier, and W. Hereman, *Supercritical solitons in two-electron temperature plasmas*, 43rd European Physical Society Conference on Plasma Physics (EPS 2016), Leuven, Belgium, July 4-8, 2016. [Presented by F. Verheest].

8. Talk: W. Hereman, *The power of the homotopy operator*, Second Colorado Nonlinear Day, University of Colorado–Colorado Springs, *Colorado Springs, Colorado*, April 30, 2016.

9. Talk: W. Hereman, *Symbolic computation of scaling invariant Lax pairs in operator form for integrable systems*, First Colorado Nonlinear Day, University of Colorado–Colorado Springs, *Colorado Springs, Colorado*, November 1, 2014.

10. Poster: J. Rezac and W. Hereman, *A symbolic algorithm for the computation of conservation laws from Lax pairs*, Eight IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, March 25-28, 2013. [Presented by J. Rezac].

11. Talk: F. Verheest, M. A. Hellberg, and W. Hereman, *Head-on collisions of electrostatic solitons in nonthermal plasmas*, 2012 International Topical Conference on Plasma Science (ITCPS 2012), *Faro, Portugal*, Advanced Plasma Concepts, September 24, 2012 [Presented by F. Verheest].

12. Poster: F. Verheest, M. A. Hellberg, and W. Hereman, *Head-on collisions of electrostatic solitons in multispecies plasmas*, 39th European Physical Society Conference on Plasma Physics & 16th International Congress on Plasma Physics, *Stockholm, Sweden*, July 2-6, 2012. [Presented by F. Verheest and M. A. Hellberg].

13. Talk and software demonstration: Ü. Göktaş and W. Hereman, *Symbolic computation of recursion operators for nonlinear differential-difference equations*, Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, *Athens, Georgia*, April 5, 2011. [Presented by Ü. Göktaş].

14. Talk and software demonstration: Ü. Göktaş and W. Hereman, *Symbolic computation of polynomial conserved densities, generalized symmetries, and recursion operators for nonlinear differential-difference equations*, Third Conference on Nonlinear Science and Complexity (NSC 2010), *Ankara, Turkey*, July 29, 2010 [Presented by Ü. Göktaş].

15. Talk and software demonstration: Ü. Göktaş and W. Hereman, *Symbolic computation of recursion operators for nonlinear differential-difference equations*, First International Symposium on Computing in Science and Engineering (ISCSE 2010), *Kusadasi, Aydin, Turkey*, June 4, 2010. [Presented by Ü. Göktaş].

16. Talk and software demonstration: L. D. Poole and W. Hereman, *An algorithmic method to symbolically compute conservation laws of nonlinear PDEs in* $(N+1)$ *dimensions*, 2010 Joint Mathematics Meetings of the American Mathematical Society and the Mathematical Association of America, *San Francisco, California*, January 16, 2010. [Presented by D. Poole].

17. Talk and software demonstration: L. D. Poole and W. Hereman, *Symbolic computation of conservation laws of nonlinear partial differential equations*, 2010 Joint Mathematics Meetings of the American Mathematical Society and the Mathematical Association of America, *San Francisco, California*, January 14, 2010. [Presented by D. Poole].

18. Talk and software demonstration: *Symbolic computation of Lax pairs of nonlinear partial difference equations*, 2009 SIAM Annual Meeting, *Denver, Colorado*, July 6, 2009.

19. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Rocky Mountain Section Meeting of the Mathematical Association of America, Colorado School of Mines, *Golden, Colorado*, April 17, 2009.

20. Talk: J. de la Porte, B. M. Herbst, W. Hereman and S. J. van der Walt, *An introduction to diffusion maps*, 19th Symposium of the Pattern Recognition Association of South Africa (PRASA 2008), *Cape Town, South Africa*, November 26-28, 2008 [Presented by B. Herbst].

21. Talk and software demonstration: L. D. Poole and W. Hereman, *The homotopy operator: from integration by parts to the computation of conservation laws of nonlinear PDEs in multiple dimensions*, Wolfram Technology Conference 2008, Wolfram Research, Inc., *Urbana-Champaign, Illinois*, October 24, 2008 [Presented by L. D. Poole].

22. Talk and software demonstration: *Symbolic computation of Lax pairs of nonlinear partial difference equations*, 2008 International Symposium on Discrete Equations (SIDE8), *Sainte-Adèle, Québec, Canada*, June 28, 2008.

23. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs in* $(n+1)-$*dimensions*, First Joint Meeting of the American Mathematical Society and the New Zealand Mathematical Society, Department of Mathematics, Victoria University of Wellington, *Wellington, New Zealand*, December 13, 2007.

24. Talk: W. Hereman and W. Malfliet, *The tanh method: a tool to solve nonlinear partial differential equations with symbolic software*, 9th World Multiconference on Systemics, Cybernetics, and Informatics, *Orlando, Florida*, July 10-13, 2005 [Presented by W. Malfliet].

25. Talk and software demonstration: Ü. Göktaş and Willy Hereman, *Special solutions of nonlinear PDEs*, Wolfram Technology Conference 2004, Wolfram Research, Inc., *Urbana-Champaign, Illinois*, October 23, 2004 [Presented by Ü. Göktaş].

26. Poster: *Symbolic computation of conserved densities for nonlinear evolution and lattice equations*, Los Alamos Days, University of Colorado, *Boulder, Colorado*, April 30-May 2, 1998.

27. Talk: Ü. Göktaş and Willy Hereman, *Invariants and symmetries for partial differential equations and lattices*, Fourth International Conference on Mathematical and Numerical Aspects of Wave Propagation, Colorado School of Mines, Golden, June 5, 1998. [Presented by Ü. Göktaş].

28. Talk: W. Hereman and Ü. Göktaş, *Symbolic computation of conservation laws for nonlinear PDEs and differential-difference equations*, Third International IMACS Conference on Applications of Computer Algebra (IMACS-ACA '97), Aston Wailea Resort, *Maui, Hawaii*, July 24-26, 1997 [Presented by Ü. Göktaş].

29. Poster: W. Hereman and Ü. Göktaş, *Symbolic computation of conservation laws for nonlinear PDEs and differential-difference equations*, 17th Annual International Conference on 'Nonlinear Waves and Solitons in Physical Systems, Center for Nonlinear Studies, Los Alamos National Laboratory, *Los Alamos, New Mexico*, May 12-16, 1997 [Presented by Ü. Göktaş].

30. Poster: W. Hereman and Ü. Göktaş, *Symbolic computation of conservation laws for nonlinear PDEs and differential-difference equations*, Fourth East coast computer algebra day, Northeastern University, *Boston, Massachusetts*, May 3, 1997 [Presented by Ü. Göktaş].

31. Poster: *Symbolic software for Lie symmetry computations*, Workshop on 'Symmetry and Integrability of Difference Equations', Center de Recherches Mathématiques, Université de Montréal; *Estérel, Québec, Canada*, May 22-29, 1994.

32. Talk: A. Grundland and W. Hereman, *Lie point symmetries of classical field theories*, XIX International Colloquium on Group Theoretical Methods in Physics, *Salamanca, Spain*, June 29-July 4, 1992 [Presented by A. Grundland].

33. Talk: *Symbolic software for soliton theory*, Los Alamos Days, University of Colorado, *Boulder, Colorado*, April 24-25, 1992.

34. Talk: *Symbolic software for nonlinear partial differential equations: symmetries, integrability and exact solutions*, 1992 AMS-SIAM Summer Seminar in Applied Mathematics, Department of Mathematics, Colorado State University, *Fort Collins, Colorado*, July 26-August 1, 1992.

35. Talk: *Solitary wave solutions of nonlinear PDEs using a direct method and MACSYMA*, Second International Conference on Industrial and Applied Mathematics, ICIAM '91, *Washington, D.C.*, July 8-12, 1991.

36. Talk: W. Hereman, *A Macsyma program for the Hirota method*, 13th IMACS World Congress, Trinity College, *Dublin, Ireland*, July 22-26, 1991 [Presented by L. Fishman].

37. Talk: *Applications of symbolic computation program to nonlinear PDEs in soliton theory*, Front Range Scientific Computation Circus Department of Mathematics, University of Colorado, *Denver, Colorado*, November 2, 1990.

38. Talk: *Solitary wave solutions of nonlinear PDEs using MACSYMA*, SIAM Annual Meeting, *Chicago, Illinois*, July 15-20, 1990.

39. Poster: *MACSYMA programs for PDEs and ODEs: the Painlevé test and Lie symmetry program*, Los Alamos Days, University of Colorado, *Boulder, Colorado*, April 12-14, 1990.

40. Talk and software demonstration: *MACSYMA: a guide for the perplexed*, Annual Spring Meeting of the Mathematical Association of America, Rocky Mountain Section, *Laramie, Wyoming*, April 6-7, 1990.

41. Talk and software demonstration: *MACSYMA program for the Painlevé test of non linear ordinary and partial differential equations*, Workshop on Symbolic Computation Methods in Differential Equations, Institute for Mathematics and its Applications, University of Minnesota, *Minneapolis, Minnesota*, June 26-30, 1989.

42. Talk and software demonstration: *MACSYMA program for the calculation of the symmetry group of differential equations*, Workshop on Symbolic Computation Methods in Differential Equations, Institute for Mathematics and its Applications, University of Minnesota, *Minneapolis, Minnesota*, June 26-30, 1989.

43. Poster: *MACSYMA program for the Painlevé test of non-linear ordinary and partial differential equations*, NATO School on Partially Integrable Nonlinear Evolution Equations and their Physical Applications, Centre de Physique des Houches, Ecole de Physique Théorique, *Les Houches, France*, March 21-30, 1989.

44. Talk: *Derivation of the Dym equation and its implicit solitary wave solution*, Workshop on Solitons in Nonlinear Optics and Plasma Physics, Institute for Mathematics and its Applications, University of Minnesota, *Minneapolis, Minnesota*, November 7-11, 1988.

45. Talk: *MACSYMA program for the Painlevé test of nonlinear ordinary and partial differential equations*, SIAM Annual Meeting, *Minneapolis, Minnesota*, July 11-15, 1988.

46. Talk: *Painlevé analysis, integrability and particular solutions to fifth-order dispersive evolution equations*, SIAM Annual Meeting, *Minneapolis, Minnesota*, July 11-15, 1988.

47. Poster: *Non integrability of multiple wave interactions*, SIAM Annual Meeting and 35th Anniversary, *Denver, Colorado*, October 12-15, 1987.

48. Talk: *Nonlinear mode decoupling for classes of evolution equations*, Workshop III on (nonlinear) Stability in Magneto-hydro-dynamics, University of Antwerp, *Antwerp, Belgium*, August 26-September 24, 1981.

49. Talk: *Niet-resonante golfinterakties voor klassen van evolutie vergelijkingen*, *Non-resonant wave interactions for classes of evolution equations*, Inter-university Postdoctoral Symposium on Field Theory and Statistical Mechanics, *Ovifat, Belgium*, October 24-25, 1980.

8.3 Invited Colloquium Talks and Seminars at Other Universities and Laboratories

1. Colloquium talk and software demonstration: W. Hereman, *Symbolic computation of solitary wave solutions and solitons through homogenization of degree*, Department of Mathematics and Statistics, Brock University, *St.-Catharines, Ontario, Canada*, Thursday, November 17, 2024.

2. Applied mathematics seminar talk and software demonstration: W. Hereman, *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, The State University of New York at Buffalo, *Buffalo, New York*, Friday, May 3, 2024.

3. Colloquium talk and software demonstration: W. Hereman, *Symbolic computation of solitary wave solutions and solitons through homogenization of degree*, Department of Mathematics, The State University of New York at Buffalo, *Buffalo, New York*, Thursday, May 2, 2024.

4. Seminar talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, Computer Science and Engineering, Liverpool Hope University, *Liverpool, U.K.*, Monday, February 17, 2020.

5. Colloquium talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, Khalifa University of Science and Technology, *Abu Dhabi, United Arab Emirates*, November 7, 2019.

6. Colloquium talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, Jordan University of Science and Technology, *Irbid, Jordan*, October 22, 2019.

7. Seminar and software demonstration: *Symbolic computation of Lax pairs of nonlinear systems of partial difference equations using multidimensional consistency*, Instituto de Matemática y Ciencias Afines (IMCA), National University of Engineering (UNI), *Lima, Peru*, November 28, 2017.

8. Seminar talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, School of Mathematics, University of Manchester, *Manchester, U.K.*, Tuesday, July 18, 2017.

9. Seminar talk and software demonstration: *Symbolic computation of Lax pairs of systems of nonlinear partial difference equations and their gauge equivalence*, School of Mathematics, Statistics, and Actuarial Science, University of Kent, *Canterbury, U.K.*, March 27, 2017.

10. Colloquium talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematical Sciences (Applied Mathematics), Stellenbosch University, *Stellenbosch, Matieland, South Africa*, April 24, 2014.

11. Talk: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Mini-symposium SANUM, African Institute for the Mathematical Sciences (AIMS), Muizenberg, Cape Town, South Africa, April 22, 2014.

12. Talk and software demonstration: *Symbolic computation of Lax pairs of systems of nonlinear partial difference equations using consistency around the cube*, Department of Mathematics and Statistics, University of South Florida, *Tampa, Florida*, March 21, 2014.

13. Colloquium talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics and Statistics, University of South Florida, *Tampa, Florida*, March 21, 2014.

14. Colloquium talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Departments of Mathematics & Electro-Optics, University of Dayton, *Dayton, Ohio*, October 14, 2013.

15. Colloquium talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, Ohio University, *Athens, Ohio*, October 11, 2013.

16. Software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs*, Department of Computer Sciences, Catholic University of Leuven, *Leuven, Belgium*, May 16, 2013.

17. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, Dŏguş University, *Istanbul, Turkey*, July 5, 2011.

18. Talk and software demonstration: *Symbolic computation of Lax pairs of nonlinear partial difference equations on quad-graphs. Part II – Systems of lattices*, Department of Mathematics, Istanbul Technical University, *Istanbul, Turkey*, July 4, 2011.

19. Talk and software demonstration: *Symbolic computation of Lax pairs of nonlinear partial difference equations on quad-graphs. Part I – Scalar lattices*, Department of Statistics and Computer Sciences, Kadir Has University, *Istanbul, Turkey*, July 1, 2011.

20. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mechanical Engineering, Celal Bayar University, Muradiye, *Manisa, Turkey*, June 28, 2011.

21. Talk and software demonstration: *Continuous and discrete homotopy operators: A theoretical approach made concrete and applicable*, Department of Mathematics, Bilkent University, Bilkent, *Ankara, Turkey*, June 23, 2011.

22. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Physics, Middle Eastern Technical University, *Ankara, Turkey*, June 22, 2011.

23. Talk and software demonstration: *Trilateration: The mathematics behind a local positioning system*, Department of Computer Engineering, Turgut Özal University, Keçiören, *Ankara, Turkey*, June 21, 2011.

24. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, University of Ghent, *Ghent, Belgium*, March 15, 2011.

25. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics and Computer Science, University of Antwerp, *Antwerp, Belgium*, March 14, 2011.

26. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, University of Wisconsin, *Madison, Wisconsin*, Monday, October 19, 2009.

27. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, University of Surrey, *Guildford, U.K.*, June 24, 2009.

28. *Symbolic computation of conservation laws of nonlinear partial differential equations*, Instituto de Matemática y Ciencas Afines (IMCA) & Facultad de Ciencias, Universidad Nacional de Ingeniería, *Lima, Peru*, March 13, 2009.

29. Talk and software demonstration: *Symbolic computation of Lax pairs of two-dimensional nonlinear partial difference equations*, Department of Mathematics, Catholic University of Leuven, *Leuven, Belgium*, July 29, 2008.

30. Talk: *Symbolic computation of conservation laws of nonlinear PDEs in $N+1$ dimensions*, Department of Mathematical and Statistical Sciences, University of KwaZulu-Natal, *Durban, South Africa*, April 7, 2008.

31. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs in $n+1$ dimensions*, Department of Mathematics and Statistics, La Trobe University, Bundoora, *Melbourne, Australia*, November 29, 2007.

32. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs in $n+1$ dimensions*, Department of Mathematics and Statistics, University of Canterbury, *Christchurch, New Zealand*, October 25, 2007.

33. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs in multi-dimensions*, Department of Mathematics and Statistics, University of Otago, *Dunedin, New Zealand*, September 20, 2007.

34. Talk and software demonstration: *Symbolic computation of travelling wave solutions of nonlinear partial differential and differential-difference equations*, Centre de Recherches Mathématiques, Université de Montréal, *Montréal, Québec, Canada*, May 29, 2007.

35. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs in multi-dimensions*, Centre de Recherches Mathématiques, Université de Montréal, *Montréal, Québec, Canada*, May 23, 2006.

36. Talk and software demonstration: *Continuous and discrete homotopy operators: a theoretical approach made concrete and applicable*, Department of Computational and Applied Mathematics, Rice University, *Houston, Texas*, September 19, 2005.

37. Talk and software demonstration: *Continuous and discrete homotopy operators: a theoretical approach made concrete*, Department of Pure Mathematics and Computer Algebra, University of Ghent, *Ghent, Belgium*, June 28, 2005.

38. Talk and software demonstration: *Symbolic computation of travelling wave solutions of nonlinear partial differential and differential-difference equations*, Department of Plasma Physics, Royal Military Academy, *Brussels, Belgium*, December 23, 2004.

39. Talk and software demonstration: *Continuous and discrete homotopy operators with applications in integrability testing of nonlinear PDEs and lattices*, Department of Mathematics and Statistics, La Trobe University, Bundoora, *Melbourne, Australia*, August 6, 2004.

40. Talk and software demonstration: *Continuous and discrete homotopy operators with applications in integrability testing of nonlinear PDEs and lattices. Part II*, Department of Mathematics and Statistics, University of Canterbury, *Christchurch, New Zealand*, August 3, 2004.

41. Talk and software demonstration: *Continuous and discrete homotopy operators with applications in integrability testing of nonlinear PDEs and lattices. Part I*, Department of Mathematics and Statistics, University of Canterbury, *Christchurch, New Zealand*, July 27, 2004.

42. Talk and software demonstration: *Continuous and discrete homotopy operators with applications in integrability testing of nonlinear PDEs and lattices*, Institute of Fundamental Sciences, Massey University, *Palmerston North, New Zealand*, July 9, 2004.

43. Talk and software demonstration: *Symbolic computation of travelling wave solutions of nonlinear differential-difference equations*, Physics Department, University of Antwerp, *Antwerp, Belgium*, December 23, 2003.

44. Talk and software demonstration: *Continuous and discrete homotopy operators with applications in integrability testing of nonlinear PDEs and lattices*, Department of Computer Sciences, Catholic University of Leuven, *Leuven, Belgium*, December 19, 2003.

45. Talk and software demonstration: *Continuous and discrete homotopy operators with applications in integrability testing*, Centre de Recherches Mathématiques, Université de Montréal, *Montréal, Québec, Canada*, December 4, 2003.

46. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear differential-difference equations*, Physics Department, University of Antwerp, *Antwerp, Belgium*, July 1, 2003.

47. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear differential-difference equations*, Department of Theoretical Physics (TENA), Free University of Brussels (VUB), *Brussels, Belgium*, June 19, 2003.

48. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Department of Mathematical Physics and Astronomy, University of Ghent, *Ghent, Belgium*, December 23, 2002.

49. Talk and software demonstration: *Symbolic computation of travelling wave solutions of nonlinear PDEs and lattices with Mathematica*, Physics Department, University of Antwerp, *Antwerp, Belgium*, December 19, 2002.

50. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution equations and lattices*, Department of Mathematics and Applied Mathematics, University of Cape Town, *Cape Town, South Africa*, June 8, 2001.

51. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution equations and lattices*, Joint Colloquium Department of Mathematics and Department of Applied Mathematics, Stellenbosch University, *Stellenbosch, Matieland, South Africa*, May 29, 2001.

52. Talk and software demonstration: *Solving nonlinear wave equations and lattices with Mathematica*, Department of Mathematics and Applied Mathematics, University of the Free State, *Bloemfontein, South Africa*, May 23, 2001.

53. Talk and software demonstration: *Solving nonlinear wave equations and lattices with Mathematica*, School of Mathematics, University of the Witwatersrand, *Johannesburg, South Africa*, May 22, 2001.

54. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution equations and lattices*, Center for Differential Equations, Continuum Mechanics and Applications, School of Computational and Applied Mathematics, University of the Witwatersrand, *Johannesburg, South Africa*, May 21, 2001.

55. Talk and software demonstration: *Solving nonlinear wave equations and lattices with Mathematica*, Department of Mathematical and Statistical Sciences, University of KwaZulu-Natal, *Durban, South Africa*, April 20, 2001.

56. Talk and software demonstration: *Solving nonlinear wave equations and lattices with Mathematica*, Department of Applied Mathematics, Stellenbosch University, *Stellenbosch, Matieland, South Africa*, February 21, 2001.

57. Talk and software demonstration: *Solving nonlinear wave equations with Mathematica*, Department of Physics, University of Antwerp, *Antwerp, Belgium*, December 19, 2000.

58. Talk and software demonstration: *Symbolic computation of conserved densities and generalized symmetries for nonlinear evolution and lattice equations*, Department of Mathematics, University of New Mexico, *Albuquerque, New Mexico*, October 17, 2000.

59. Talk: J. DeSanto, W. Hereman, and M. Misra, *Application of wavelet transforms in rough surface scattering*, Sandia Laboratories, *Albuquerque, New Mexico*, December 10, 1998.

60. Talk and software demonstration: *Symbolic computation of conserved densities of nonlinear evolution and differential-difference equations*, Centre de Recherches Mathématiques, Université de Montréal, *Montréal, Québec, Canada*, May 23, 1997.

61. Talk: *Spline-based wavelets with applications*, Department of Physics, University of Antwerp, *Antwerp, Belgium*, May 23, 1996.

62. Joint colloquium talk: *Wavelets: theory and selected applications*, Departments of Physics and Electrical Engineering, University of Alabama, Huntsville, Alabama, March 12, 1996.

63. Talk: *Modified bilinear and Hirota formalism for nonlinear equations*, Division of Mathematical Physics and Astronomy, University of Ghent, *Ghent, Belgium*, April 28, 1995.

64. Talk and software demonstration: *Symbolic software for nonlinear partial differential equations*, Department of Physics, University of Antwerp, *Antwerp, Belgium*, April 27, 1995.

65. *Wavelets: an introduction*, Department of Physics, University of Antwerp, *Antwerp, Belgium*, January 11, 1994.

66. Talk and software demonstration: *Symbolic programs for the study of nonlinear evolution equations*, Department of Theoretical Physics, Free University of Brussels, *Brussels, Belgium*, December 21, 1993.

67. Talk: *Symbolic computations for nonlinear partial differential equations from soliton theory*, Departement de Physique, Université du Québec à *Trois-Rivières, Québec, Canada*, January 9, 1992.

68. Talk and software demonstration: *MACSYMA, exact solutions of nonlinear evolution equations, and solitons*, Institute for Theoretical Mechanics, University of Ghent, *Ghent, Belgium*, December 17, 1991.

69. Talk and software demonstration: *The trilateration program*, Thunder Basin Coal Company, *Wright, Wyoming*, June 20, 1991.

70. Talk: *Construction of explicit and implicit solitary wave solutions to classes of nonlinear evolution and wave equations*, Department of Mathematics, University of Wisconsin, *Milwaukee, Wisconsin*, April 14, 1989.

71. Talk: *Construction of explicit and implicit solitary wave solutions to classes of nonlinear evolution and wave equations*, Department of Mathematics, Virginia Polytechnic Institute and State University, *Blacksburg, Virginia*, March 3, 1989.

72. Talk: *Review of methods to construct soliton solutions for nonlinear evolution and wave equations*, Centre de Recherches Mathématiques, Université de Montréal, *Montréal, Québec, Canada*, January 23, 1989.

73. Talk: *Methods to construct soliton solutions for nonlinear evolution and wave equations*, Institute for Modeling, Non-linear Dynamics and Irreversible Thermodynamics, Technical University of Denmark, *Lyngby, Denmark*, January 13, 1989.

74. Talk: *Derivation of the Dym equation, its implicit solution and its connection with the KdV and mKdV equations*, Department of Mathematics, University of *Groningen, The Netherlands*, January 10, 1989.

75. Talk: *Derivation of the Dym equation, its implicit solution and its connection with the KdV and mKdV equations*, Institute for Theoretical Mechanics, University of Ghent, *Ghent, Belgium*, January 4, 1989.

76. Talk: *Hirota's method versus Painlevé analysis for nonlinear evolution equations*, Institute for Theoretical Mechanics, University of Ghent, *Ghent, Belgium*, May 27, 1988.

77. Talk: *The construction of implicit and explicit soliton solutions of nonlinear evolution and wave equations*, Department of Electrical Engineering, State University of New York at *Binghamton, New York*, June 2, 1987.

78. Talk: *A direct algebraic method for the construction of solitary wave solutions for a class of nonlinear evolution and wave equations*, Department of Mathematics, University of Assiut, *Assiut, Egypt*, January 10, 1987.

79. Talk: *Recent developments in the theory of acousto-optics*, Department of Physics, Dalhousie University and Department of Engineering Physics, Technical University of Nova Scotia, *Halifax, Nova Scotia, Canada*, April 10, 1986.

80. Talk: *Exact solitary wave solutions of nonlinear evolution and wave equations using a direct algebraic method*, Department of Mathematics and Mathematical Research Center, University of Wisconsin, *Madison, Wisconsin*, January 29, 1986.

81. Talk: *Recent developments in the theory of acousto-optics*, Department of Electrical and Computer Engineering, Syracuse University, *Syracuse, New York*, April 26, 1985.

82. Talk: *Recent developments in the theory of acousto-optics*, Department of Electrical and Computer Engineering, Virginia Polytechnic Institute and State University, *Blacksburg, Virginia*, April 23, 1985.

83. Talk: *A general direct method of constructing solitary waves from linear solutions*, Department of Applied Mathematics, University of Manitoba, *Winnipeg, Manitoba, Canada*, May 28, 1984.

84. Talk: *Diffraction of light by ultrasound*, Department of Applied Mathematics, University of Manitoba, *Winnipeg, Manitoba, Canada*, May 1, 1981.

8.4 Colloquium Talks and Seminars at Local Universities

1. W. Hereman, *Symmetry – A ubiquitous concept in nature and science*, Osher Lifelong Learning Institute (OLLI), University of Denver, Jefferson Unitarian Church, *Golden, Colorado*, April 19, 2023.

2. Colloquium talk: W. Hereman, *Symbolic computation of solitary wave solutions and solitons through homogenization of degree*, Department of Mathematics, University of Colorado-Colorado Springs, *Colorado Springs, Colorado*, February 23, 2023.

3. Colloquium talk: W. Hereman, *Symbolic computation of solitary wave solutions and solitons through homogenization of degree*, Department of Applied Mathematics and Statistics, Colorado School of Mines, *Golden, Colorado*, September 23, 2022.

4. Talk: W. Hereman, *The Hirota method revisited: Computation of solitary wave solutions and solitons through homogenization of degree*, Nonlinear waves seminar, Department of Applied Mathematics, University of Colorado, *Boulder, Colorado*, February 22, 2022.

5. Talk: W. Hereman, *Tools from the calculus of variations and differential geometry to investigate conservation laws nonlinear PDES and DDEs*, Nonlinear waves seminar, Department of Applied Mathematics, University of Colorado, *Boulder, Colorado*, January 28, 2020.

6. Heiland Lecture: W. Hereman, *Symmetry Anyone?*, Department of Geophysics, Colorado School of Mines, *Golden, Colorado*, February 23, 2017.

7. Talk: W. Hereman, *Symbolic computation of scaling invariant Lax pairs in operator form for integrable systems*, Nonlinear waves seminar, Department of Applied Mathematics, University of Colorado, *Boulder, Colorado*, February 23, 2016.

8. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Nonlinear waves seminar, Department of Applied Mathematics, University of Colorado, *Boulder, Colorado*, October 7, 2014.

9. Colloquium talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, University of Colorado, *Colorado Springs, Colorado*, October 20, 2011.

10. Talk and software demonstration: W. Hereman and W. Navidi, *Trilateration*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, April 15, 2011.

11. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, September 25, 2009.

12. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematics, Colorado State University, *Fort Collins, Colorado*, Thursday, September 17, 2009.

13. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear partial differential equations*, Department of Mathematical Sciences, University of Northern Colorado, *Greeley, Colorado*, April 14, 2009.

14. Talk and software demonstration: *Symbolic computation of Lax pairs of two-dimensional nonlinear partial difference equations*, Physics Department, Colorado School of Mines, *Golden, Colorado*, February 24, 2009.

15. Talk and software demonstration: *Symbolic computation of Lax pairs of two-dimensional nonlinear partial difference equations*, Nonlinear waves seminar, Department of Applied Mathematics, University of Colorado, *Boulder, Colorado*, November 18, 2008.

16. Talk and software demonstration: *Symbolic computation of Lax pairs of two-dimensional nonlinear partial difference equations*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, October 3, 2008.

17. Talk and software demonstration: *Symbolic computation of conservation laws of nonlinear PDEs in multi-dimensions*, Institute for Mathematics Applied to Geosciences (IMAGe), National Center for Atmospheric Research (NCAR), *Boulder, Colorado*, April 5, 2007.

18. Talk and software demonstration: *Continuous and discrete homotopy operators: a theoretical approach made concrete and applicable*, Department of Mathematics, Colorado State University, *Fort Collins, Colorado*, September 29, 2005.

19. Talk and software demonstration: *Continuous and discrete homotopy operators with applications in integrability testing*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, October 31, 2003.

20. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Department of Mathematics, Colorado State University, *Fort Collins, Colorado*, April 17, 2003.

21. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Department of Mathematics, University of Colorado, *Colorado Springs, Colorado*, September 26, 2002.

22. Talk and software demonstration: *Teaching your computer to do real mathematics*, Davidson Young Scholars Reunion Gathering, Davidson Institute and Colorado School of Mines, *Golden, Colorado*, June 21, 2002.

23. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Department of Applied Mathematics, University of Colorado, *Boulder, Colorado*, February 28, 2002.

24. Talk and software demonstration: *Solving nonlinear PDEs and lattices with Mathematica*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, February 8, 2002.

25. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Department of Applied Mathematics, University of Colorado, *Boulder, Colorado*, October 22, 1999.

26. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, September 24, 1999.

27. Talk and software demonstration: *Symbolic computation of conserved densities, generalized symmetries, and recursion operators for nonlinear evolution and lattice equations*, Department of Mathematics, University of Colorado, *Colorado Springs, Colorado*, September 23, 1999.

28. Talk and software demonstration: *Symbolic computation of conserved densities and symmetries of nonlinear evolution and differential-difference equations*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, November 25, 1997.

29. Talk: *Solving PDEs through homogenization*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, February 27, 1996.

30. Talk: *Wavelets: theory and applications. An introduction*, Division of Engineering, Colorado School of Mines, *Golden, Colorado*, March 21, 1995.

31. Talk: *Wavelets: theory and applications. An introduction*, Computational Modeling Seminar, Division of Engineering, Colorado School of Mines, *Golden, Colorado*, February 27, 1995.

32. Lecture series: *Lectures on Wavelets* (5 lectures), Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, October 25, November 1, 8, 15, and 22, 1994.

33. Talk and software demonstration: *Symbolic computation for investigating nonlinear partial differential equations*, Colloquium Series, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, September 16, 1994.

34. Talk: *Wavelets: an introduction*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, February 14, 1994.

35. Talk and software demonstration: *Symbolic computing in research*, National Institute of Standards and Technology (NIST), *Boulder, Colorado*, March 10, 1992.

36. Talk and software demonstration: *Symbolic computing in research*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, February 24, 1992.

37. Talk and software demonstration: *The bulldozer project*, Briefing for Thunder Basin Coal Company, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, February 1, 1991, and Graduate Seminar, February 4, 1991.

38. Talk and software demonstration: *Solitary waves solutions of PDEs using a direct method and MACSYMA*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, October 1, 1990.

39. Talk and software demonstration: *Solitary waves solutions of PDEs using a direct method and MACSYMA*, Department of Physics, Colorado School of Mines, *Golden, Colorado*, September 18, 1990.

40. Talk and software demonstration: *MACSYMA: a guide for the perplexed*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, March 5, 1990.

41. Talk and software demonstration: *Solitary wave solutions of PDEs using MACSYMA*, Department of Mathematics, University of Colorado, *Boulder, Colorado*, October 19, 1989.

42. Talk and software demonstration: *Exact solitary wave solutions to non-linear evolution and wave equations using a direct algebraic method and MACSYMA*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, October 2, 1989.

43. Talk and software demonstration: *Construction of explicit and implicit solitary wave solutions to classes of nonlinear evolution and wave equations*, Department of Mathematical and Computer Sciences, Colorado School of Mines, *Golden, Colorado*, July 7, 1989.

44. Talk: *Connections between the Dym, KdV and the mKdV equations*, Department of Mathematics and Mathematical Research Center, University of Wisconsin, *Madison, Wisconsin*, October 12, 1988.

45. Talk and software demonstration: *MACSYMA: reboot*, Department of Mathematics, University of Wisconsin, *Madison, Wisconsin*, November 11, 1987.

46. Talk and software demonstration: *MACSYMA: a guide for the perplexed*, Department of Mathematics, University of Wisconsin, *Madison, Wisconsin*, November 4, 1987.

47. Talk: *Intimate connections between the KdV, the mKdV and the Harry Dym equations*, Department of Mathematics and Mathematical Research Center, University of Wisconsin, *Madison, Wisconsin*, October 21, 1987.

48. Talk and software demonstration: *MACSYMA*, Department of Mathematics and Mathematical Research Center, University of Wisconsin, *Madison, Wisconsin*, October 20, 1987.

49. Talk: *Developments in acousto-optics*, Department of Mathematics and Mathematical Research Center, University of Wisconsin, *Madison, Wisconsin*, September 30, 1986.

50. Talk: *Mathematical aspects of physics/engineering developments in nonlinear waves and acousto-optics*, Department of Electrical and Computer Engineering, University of Iowa, *Iowa City, Iowa*, March 21, 1986.

51. Talk: *Exact solitary wave solutions of nonlinear evolution and wave equations using a direct algebraic method*, Department of Electrical and Computer Engineering, University of Iowa, *Iowa City, Iowa*, February 13, 1986.

52. Talk: *Exact solitary wave solutions of nonlinear evolution and wave equations using a direct algebraic method*, Department of Mathematics, University of Iowa, *Iowa City, Iowa*, November 21, 1985.

53. Talk: *Outline of a general direct method of constructing solitary waves from linear solutions*, Department of Electrical and Computer Engineering, University of Iowa, *Iowa City, Iowa*, April 19, 1984.

54. Talk: *Some recent developments in the theory of acousto-optics*, Department of Electrical and Computer Engineering, University of Iowa, *Iowa City, Iowa*, March 8, 1984.

8.5 Participation in Conferences and Workshops

1. "Science convergence in an inclusive and diverse world," Sigma Xi – The Scientific Research Honor Society, 2022 International Forum on Research Excellence (IFoRE22), *Alexandria, VA*, virtual (hybrid), Nov. 3-6, 2022.

2. "Roots to fruits: Responsible research for a flourishing humanity – how scientific virtues serve society," Sigma Xi – The Scientific Research Honor Society, Annual Meeting, Research Conference, and Art Exhibit (AMSRC), virtual, Nov. 4-7, 2021.

3. "Hacking the brain: The intersection between brain and neuroscience," Sigma Xi – The Scientific Research Honor Society, Annual Meeting, Research Conference, and Art Exhibit (AMSRC), virtual, Nov. 5-8, 2020.

4. Workshop on "Nonlinear Algebra in Applications," ICERM, *Providence, RI*, Nov. 12-16, 2018.

5. American Mathematical Society Committee on Science Policy Forum, *Washington, DC,* March 4-5, 2011.

6. Eight Annual Pikes Peak Region Undergraduate Mathematics (PPRUM) Conference, United States Air Force Academy, *Colorado Springs, Colorado*, February 26, 2011.

7. Opening Session of International Symposium II on Unconventional Plasmas, Eindhoven University of Technology, *Eindhoven, The Netherlands*, August 14-16, 2006.

8. SIAM Second Front Range Applied Mathematics (FRAM) Student Conference, University of Colorado, *Denver, Colorado*, March 11, 2006.

9. First Annual Front Range Undergraduate Mathematical Sciences Conference, Colorado School of Mines, *Golden, Colorado*, October 30, 2004.

10. NSF-CBMS Regional Conference on Numerical Methods in Forward and Inverse Electromagnetic Scattering, Colorado School of Mines, *Golden, Colorado*, June 3-7, 2002.

11. Board of Trustees Conference Colorado School of Mines, *Allenspark, Colorado*, June 11-13, 1998.

12. Conference on Education: Teaching with Technology, Colorado School of Mines, *Golden, Colorado*, July 29-31, 1996.

13. Joint AMS-BeNeLux International Meeting, University of Antwerp, *Antwerp, Belgium*, May 22-25, 1996.

14. Kick off Meeting, Multi-disciplinary University Research Initiative (MURI), Air Force Office of Scientific Research Computational Electromagnetics Initiative, University of Delaware, *Newark, Delaware*, November 4, 1995.

15. Mini-conference "Rocky Mountain Experience IV", University of Colorado, *Boulder, Colorado*, August 3-4, 1994.

16. Mini-conference "Rocky Mountain Experience III", University of Colorado, *Boulder, Colorado*, August 17-18, 1993.

17. Midwest Dynamical Systems Conference, University of Colorado, *Boulder, Colorado*, March 26-28, 1993.

18. Los Alamos Days, University of Colorado, *Boulder, Colorado*, March 25, 1993.

19. Contact Group on Theoretical and Analytical Mechanics, University of Ghent, *Ghent, Belgium*, December 19, 1991.

20. Addison-Wesley Workshop on 'Technology in the Mathematics Curriculum', *Denver, Colorado*, November 22, 1991.

21. Workshop on Computer Algebra Software and the Teaching of Calculus, Department of Mathematics and Computer Science, University of Denver, *Denver, Colorado*, October 5-7, 1990.

22. Workshop on Solitons in Physics and Mathematics, Institute for Mathematics and its Applications, University of Minnesota, *Minneapolis, Minnesota*, September 12-16, 1988.

23. Inter-university Postdoctoral Symposium on Field Theory and Statistical Mechanics, *Han-sur-Lesse, Belgium*, October 12-13, 1984.

24. International School of Physical Acoustics: Fundamental Principles and Applications of Acoustic Waves, *Erice, Trapani, Italy*, November 30-December 10, 1982.

25. Inter-university Postdoctoral Symposium on Field Theory and Statistical Mechanics, *Houthalen, Belgium*, October 1-2, 1982.

26. Solitons *'82*: Scott Russell Centenary Conference and Workshop, Heriot-Watt University, *Edinburgh, U.K.*, August 22-27, 1982.

27. International Post University Courses, University of Ghent, *Ghent, Belgium*, August 15-21, 1982.

28. Dynamics Days Twente '82, Twente University of Technology, *Enschede, The Netherlands*, May 25-26, 1982.

29. Conference of the Belgian Mathematical Society, University of Antwerp, *Antwerp, Belgium*, May 13-14, 1982.

30. Inter-university Postdoctoral Symposium on Geodesy and Geophysics, *Han-sur-Lesse, Belgium*, February 17-19, 1982.

31. Inter-university Postdoctoral Symposium on Field Theory and Statistical Mechanics, *Tiege-lez-Spa, Belgium*, October 2-3, 1981.

32. Workshop II on (nonlinear) Stability in Magneto-hydro-dynamics, University of Antwerp, *Antwerp, Belgium*, September 1-30, 1980.

33. Dynamics Days Twente '80, Twente University of Technology, *Enschede, The Netherlands*, April 15-16, 1980.

34. Inter-university Postdoctoral Symposium on Field Theory and Statistical Mechanics, *Kasterlee, Belgium*, October 5-6, 1979.

9 Awards and Honors

9.1 Awards

- Recipient of the Albert Nelson Marquis Lifetime Achievement Award, 2017.
- 2016 Outstanding Philanthropic Partner Award, Colorado School of Mines Foundation, February 2016.
- NATO Research Fellowships (supporting postdoctoral visits to the U.S.A.), September 1985–July 1986, and September 1983–July 1984.
- Prize of the Royal Academy of Sciences, Literature and Fine Arts of Belgium, Brussels, Belgium, 1985.
- Special Prize for Mathematics, City Council of Lokeren, Lokeren, Belgium, 1972.
- Special Prize for History, City Council of Lokeren, Lokeren, Belgium, 1972.

9.2 Honors

- Benefactor of the Professor Willy Hereman Endowed Scholarship Fund, 2018-present.
- President of the Colorado School of Mines Chapter of Sigma Xi – The Scientific Research Honor Society, 2021-present.
- Listed in Marquis Who's Who in Education in Colorado, 2020.
- Listed in Marquis Who's Who in America, 2020.
- Vice-President and President-Elect of the Colorado School of Mines Chapter of Sigma Xi – The Scientific Research Honor Society, 2019-2021.
- Received Research Professor Emeritus status, November 2019.
- Honored by former MS student Douglas Baldwin with the establishment of the Professor Willy Hereman Endowed Scholarship Fund, 2018-present.
- Elected Full Member of Sigma Xi – The Scientific Research Honor Society, 2018.
- Received Professor Emeritus status, December 2016.
- Listed in American Men and Women in Science, Gale Cengage Learning, 2016.
- Listed in Marquis Who's Who in America, 70th Platinum Anniversary Edition, 2016.
- Listed in Marquis Who's Who in America, 69th Edition, 2015.
- Listed in Marquis Who's Who in America, 68th Edition, 2014.
- The paper "An introduction to diffusion maps" by J. de la Porte, B. M. Herbst, W. Hereman, and S. J. van der Walt (Proceedings of the 19th Symposium of the Pattern Recognition Association of South Africa - PRASA 2008, Ed.: F. Nicolls, Univ. Cape Town, Cape Town, South Africa (2008), pp. 15-25) was a key reference for Patent No. US 8,629,872 B1 *System and Method for Displaying and Analyzing Financial Correlation Data* by Wesley Phao, The Capital Group Companies, Inc., Los Angeles, CA., 2013.
- The paper "Symbolic computation of exact solutions expressible in hyperbolic and elliptic functions for nonlinear PDEs" by D. E. Baldwin, Ü. Göktaş, W. Hereman, L. Hong, R. Martino, and J. C. Miller (Journal of Symbolic Computation **37**(6), pp. 669-705, 2004) is in the journal's top five of most downloaded papers in the first semester of 2013.
- The paper "The tanh method II. Perturbation technique for conservative systems" by W. Malfliet and W. Hereman (Physica Scripta **54**(6), pp. 569-575, 1996) was featured by Elsevier Publishing in the article "Section 4: Expert Opinion. *Sleeping Beauties* or delayed recognition: when old ideas are brought to bibliometric life," Research Trends, Issue **21**, January 2011, pp. 9-11.

  See: http://www.researchtrends.com/category/issue21-january-2011.
- Listed in Marquis Who's Who in America, 65th Edition, 2011.
- Listed in Marquis Who's Who in America, 64th Edition, 2010.
- Listed in Marquis International Who's Who in America, 63rd Edition, vol. 1, p. 2168, 2009.
- Listed in Who's Who in Engineering Education, http://engineering.academickeys.com/index.php (2005).
- Visiting Lecturer, Program of Visiting Lecturers, The Mathematical Association of America, 1996-1998.
- Listed in Dictionary of International Biography, Year 1994-1995, 24th Edition, Fall 1995.
- Listed in International Who's Who of Intellectuals, 11th Edition, 1994.
- Listed in Marquis Who's Who in America, Special Index Section, 47th Edition, vol. 2, 1992-1993, p. 3966 and p. 3793.
- Listed in Marquis Who's Who in America, Special Index Section, 48th Edition, vol. 2, 1994, p. 3889 and 4060.

- Marquis Who's Who in America, Regional and Topical Register, 49th Edition, vol. 2, 1995, p. 4180.
- Listed in Marquis Who's Who in the West, 26th Edition, 1997-1998.
- Listed in Marquis Who's Who in the West, Silver Anniversary 25th Edition, 1996-1997, p. 370.
- Listed in Marquis Who's Who in the West, 24th Edition, 1994-1995, p. 364.
- Listed in Marquis Who's Who in the West, 23rd Edition, 1992-1993, p. 311.
- Listed as International Man of the Year 1992-1993, Men of Achievement, 16th Edition, 1993.
- Listed as International Man of the Year 1995-1996, Men of Achievement, 17th Edition, 1996.
- Listed in Marquis Who's Who in the World, 12th Edition, 1995-1996.
- Listed in International Who's Who of Professionals, 2th Edition, 1995-1996.
- Listed in Marquis Who's Who in Science and Engineering, 2nd Edition, 1993-1994.
- Listed in Marquis Who's Who in Science and Engineering, 1st Edition, 1992-1993.
- Listed in The National Faculty Directory, Gale Research Inc., Detroit, 27th Edition, vol. 2 (1997) p. 1469; 23rd Edition, vol. 2 (1993) p. 1450, 22nd Edition, vol. 2 (1992) p. 1505.
- Listed in Dictionary of International Biography, Biographical Record of Contemporary Achievement, 24th Edition, Fall 1995.
- Listed in Dictionary of International Biography, Biographical Record of Contemporary Achievement, 23rd Edition, 1993-1994.
- Listed in The Faculty White Pages, Gale Research Inc., Detroit, p. 1363, 1992.

10 CSM Committee Service

10.1 Departmental

- Head of Applied Mathematics and Statistics (August 2012-June 2016).
- Interim Head of Applied Mathematics and Statistics (August 2011-August 2012).
- Chair, Department Head Search Committee (2009-2010).
- Member, Executive Committee (1997-Spring 2011).
- Chair, Tenure and Promotion Committee (1998-1999, 2002-2003, 2004-2007, 2008-Spring 2011).
- Coordinator of the Ryan Sayers Memorial Award and the Ryan Sayers Memorial Scholarship (2004-2016).
- Editor of the MCS Publication Series (1990-2010).
- Member, Graduate Advisory Committee (1995-2000, 2010-Spring 2011).
- Member, Search Committee for Computer Science Lecturer (2008-2009).
- Member, Search Committee for Mathematics Lecturers (2008-2009).
- Member, Mathematical Education Search Committee (2006-2007)
- Member, Undergraduate Advisory Committee (1994-95, 2002-2003, 2006-2007).
- Organizer of Weekly Graduate Seminars and Colloquia (1989-1992, 2005-2006).
- Co-chair, Undergraduate Advisory Committee (2003-2004).
- Member, Computational and Applied Mathematics Search Committee (2003-2004).
- Member, Self-study Task Force (2002-2003).
- Member, Computer Science Search Committee (1997-1998, 2002-2003).

- Chair, Applied Mathematics Search Committee (1998-1999, 2001-2002).
- Director of Graduate Studies in MCS (1997-2000).
- Chair, Graduate Advisory Committee (1997-2000).
- Member, Search Committee for Engineering Division (1997-1998).
- Member, Statistics Search Committee (1996-1997).
- Member, Task Force for Systems Administrator (1994-1996).
- Coordinator of Undergraduate Computing Laboratory (1994-1995).
- Responsible for Comprehensive and Qualifying Exams (1989-1996).
- Member, Graduate Core Curriculum Committee (1994).
- Consultant for the Use of Computer Algebra Systems.
- Demos with Symbolic Software for Davidson Institute for Talent Development, Summer Camp for American Indians; Summer Minority Engineering Training (SUMMET); Student-Parent Days; Visiting Committee, etc.
- Advisor to numerous Undergraduate Students.

10.2 Campus Wide

- Member, Mines Foundation – Faculty & Staff Giving Program Committee (2016-2019).
- Member, Faculty Grievance Committee (2015-2018).
- Member, University Faculty Handbook Committee (2012-2014).
- Member, McBride Honors Program Futures Committee (Spring 2010).
- Member, EPICS Review Committee (2008-2009).
- Member, Calendar Committee (2006-2008).
- Member, CSM Tenure and Promotion Committee (2003-2006).
- Representative to Research Council (2002-2003, 2004-2005, 2006-2007).
- Member, Committee for Improvement of CTLM Building (2002).
- Advisor for campus wide use of Computer Algebra Systems (1991-2016).
- Participant in Various Activities of the Society of Women Engineers (2000-2019).
- Participant in Various Activities of the McBride Honors Program (1996-2019).
- Member, Graduate Council (1997-2000).
- McBride Honors Program–Tutorial Committee (1996-2000).
- McBride Honors Program–Executive Committee (1999-2000).
- Member, Academic Planning Council (1994-1999).
- Member, Core Curriculum Committee (1991-1992).