

Daniel Appelö

Curriculum Vitae

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Department of Applied Mathematics

University of Colorado, 526 UCB,

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Employment

- 2017– **Associate Professor in Applied Mathematics**, *University of Colorado Boulder*, USA.
- 2017–2019 **Visiting Professor in Scientific Computing (Summers)**, *Uppsala University*, Uppsala, Sweden.
- 2016–2017 **Associate Professor in Applied Mathematics**, *The University of New Mexico*, Albuquerque, USA.
- 2011–2016 **Assistant Professor in Applied Mathematics**, *The University of New Mexico*, Albuquerque, USA.
- 2008–2011 **Postdoctoral scholar in Mechanical Engineering**, *California Institute of Technology*, Pasadena, USA, Advisor: Tim Colonius.
- 2008–2009 **Postdoctoral scholar in Applied Computational Mathematics**, *California Institute of Technology*, Pasadena, USA, Advisor: Oscar Bruno.
- 2006–2008 **Postdoctoral fellow**, *Center for Applied and Scientific Computing, Lawrence Livermore Nat. Lab.*, Livermore, USA, Advisor: Anders Petersson.
- 2006–2006 **Hans Werthen Prize postdoctoral scholar**, *The University of New Mexico*, Albuquerque, USA, Advisor: Thomas Hagstrom.
- 2001–2006 **Graduate student in Numerical Analysis**, *Royal Institute of Technology*, Stockholm, Sweden.

Education

- 2001–2006 **Ph.D. Numerical Analysis**, *Royal Institute of Technology*, Stockholm, Sweden, *Absorbing Layers and Non-Reflecting Boundary Conditions for Wave Propagation Problems*.
Advisor: Prof. Gunilla Kreiss
- 2001–2003 **Licenciates degree in Numerical Analysis**, *Royal Institute of Technology*, Stockholm, Sweden, *Non-reflecting Boundary Conditions for Wave Propagation Problems*.
Advisor: Prof. Gunilla Kreiss
- 1996–2001 **M.S. Electrical Engineering**, *Royal Institute of Technology*, Stockholm, Sweden.

Professional Recognition, Honors and Diversity Initiatives

- 2020 **ICERM Research fellow. Fall 2020 semester program “Advances in Computational Relativity”**, *ICERM at Brown University*. Sep. 9 - Dec. 11, 2020.
- 2019 **Program for Mathematics 2019, Knut and Alice Wallenbergs Foundation**, *Visiting Professor at Uppsala University*.
- 2018 **BOLD (Broadening Opportunity through Leadership and Diversity) Faculty Fellow**, *For: Improving Inclusive Excellence in Computational Science & Engineering*.
- 2018 **IMPART, Implementation of Multicultural Perspectives and Approaches in Research and Teaching Award**, *For: STEMInist Seminar: Fostering Community and Awareness in STEM*.
- 2006 **Hans-Werthen Prize 2006.**, *This is a prize for doing a postdoc outside Sweden*.
- 2001 & 2004 **Generaldirektör Waldemar Borgeman prize**.

2002 & 2005 **Erik Petersohns minnesfond prize.**
2004 & 2005 **Stiftelsen Lars Hiertas minne prize.**

Publications

Submitted Articles

- [S1] Oleksii Beznosov and Daniel Appelö. Hermite - discontinuous Galerkin overset grid methods for the scalar wave equation. *Journal of Computational Physics*, Submitted (2019).
- [S2] Daniel Appelö, Vrushali A. Bokil, Yingda Cheng, and Fengyan Li. Energy stable SBP-FDTD methods for Maxwell-Duffing models in nonlinear photonics. *IEEE Journal on Multiscale and Multiphysics Computational Techniques*, 2019 (Submitted).

Accepted Articles

- [A3] Klaus Heinemann, Daniel Appelö, Desmond P. Barber, Oleksii Beznosov, and James A. Ellison. The Bloch equation for spin dynamics in electron storage rings: computational and theoretical aspects. *International Journal of Modern Physics A*, 2019 (Accepted).
- [A4] M. Motamed and D. Appelö. Wasserstein metric-driven bayesian inversion with application to wave propagation problems. *International Journal for Uncertainty Quantification*, 2019 (To appear).
- [A5] Lu Zhang, Thomas Hagstrom, and Daniel Appelö. An energy-based discontinuous Galerkin method for the wave equation with advection. *SIAM Journal of Numerical Analysis*, 2019 (Accepted).

Articles in Archival Journals

- [J6] D. Appelö and S. Wang. An energy-based discontinuous Galerkin method for coupled elasto-acoustic wave equations in second-order form. *International Journal for Numerical Methods in Engineering*, 119(7):618–638, 2019.
- [J7] D. Appelö, T. Hagstrom, and A. Vargas. Hermite methods for the scalar wave equation. *SIAM Journal on Scientific Computing*, 40(6):A3902–A3927, 2018.
- [J8] A. Kornelius and D. Appelö. Flux-conservative Hermite methods for simulation of nonlinear conservation laws with shocks. *J. of Sci. Comput.*, 76:24–47, 2018.
- [J9] M. Motamed and D. Appelö. A MultiOrder discontinuous Galerkin Monte Carlo method for hyperbolic problems with stochastic parameters. *SIAM J. on Numer. Anal.*, 56(1):448–468, 2018.
- [J10] D. Appelö and T. Hagstrom. An energy-based discontinuous Galerkin discretization of the elastic wave equation in second order form. *Comput. Meth. Appl. Mech. Engrg.*, 338:362–391, 2018.
- [J11] D. Appelö, G. Kreiss, and S. Wang. An explicit Hermite-Taylor method for the Schrödinger equation. *Communications in Computational Physics*, 21(5):1207–1230, 2017.
- [J12] Adeline Kornelius and Daniel Appelö. On the scaling of entropy viscosity in high order methods. *Springer Lecture Notes in Computational Science and Engineering*, 2016.
- [J13] D. Appelö and T. Hagstrom. A new discontinuous Galerkin formulation for wave equations in second order form. *SIAM Journal On Numerical Analysis*, 53(6):2705–2726, 2015.
- [J14] T. Hagstrom and D. Appelö. Solving PDEs with Hermite Interpolation. In *Springer Lecture Notes in Computational Science and Engineering*, 2015.
- [J15] X. Chen, D. Appelö, and T. Hagstrom. A hybrid Hermite–discontinuous Galerkin method for hyperbolic systems with application to Maxwell’s equations. *Journal of Computational Physics*, 257, Part A:501 – 520, 2014.
- [J16] D. Appelö and N. A. Petersson. A fourth-order embedded boundary method for the wave equation. *SIAM Journal on Scientific Computing*, 34(6):2982–3008, 2012.

- [J17] D. Appelö, J. W. Banks, W. D. Henshaw, and D. W. Schwendeman. Numerical methods for solid mechanics on overlapping grids: Linear elasticity. *Journal of Computational Physics*, 231(18):6012–6050, 2012.
 - [J18] T. Hagstrom, D. Appelo, T. Colonius, M. Inkman, and C. Y. Jang. Simulation of compressible flows using Hermite methods. *The Journal of the Acoustical Society of America*, 131(4):3429–3429, 2012.
 - [J19] D. Appelö and T. Hagstrom. On advection by Hermite methods. *Pacific Journal Of Applied Mathematics*, 4(2):125–139, 2011.
 - [J20] C.L. Ting, D. Appelö, and Z.G. Wang. Minimum energy path to membrane pore formation and rupture. *Physical Review Letters*, 106(16):168101, 2011.
 - [J21] A. Samanta, D. Appelö, T. Colonius, J. Nott, and J. Hall. Computational modeling and experiments of natural convection for a titan montgolfiere. *AIAA Journal*, 5:1007–1016, 2010.
 - [J22] D. Appelö and T. Colonius. A high-order super-grid-scale absorbing layer and its application to linear hyperbolic systems. *Journal of Computational Physics*, 228(11):4200–4217, 2009.
 - [J23] D. Appelö and N. A. Petersson. A stable finite difference method for the elastic wave equation on complex geometries with free surfaces. *Communications in Computational Physics*, 5(1):84–107, 2009.
 - [J24] D. Appelö and T. Hagstrom. A general perfectly matched layer model for hyperbolic-parabolic systems. *SIAM Journal on Scientific Computing*, 31(5):3301–3323, 2009.
 - [J25] V. Eliasson, W. D. Henshaw, and D. Appelö. On cylindrically converging shock waves shaped by obstacles. *Physica D: Nonlinear Phenomena*, 237(14-17):2203–2209, 2008.
 - [J26] D. Appelö and G. Kreiss. Application of a perfectly matched layer to the nonlinear wave equation. *Wave Motion*, 44(7-8):531–548, 2007.
 - [J27] T. Hagstrom and D. Appelö. Automatic Symmetrization and Energy Estimates Using Local Operators for Partial Differential Equations. *Communications in Partial Differential Equations*, 32(7):1129–1145, 2007.
 - [J28] D. Appelö, T. Hagstrom, and G. Kreiss. Perfectly matched layers for hyperbolic systems: General formulation, well-posedness, and stability. *SIAM Journal on Applied Mathematics*, 67(1):1–23, 2006.
 - [J29] D. Appelö and G. Kreiss. A new absorbing layer for elastic waves. *Journal of Computational Physics*, 215(2):642–660, 2006.
- [Proceedings](#)
- [P30] Tracy Babb, Per Gunnar Martinsson, and Daniel Appelö. HPS accelerated spectral solvers for time dependent problems: Part 1, algorithms. In *Proceedings of: Spectral and High Order Methods for Partial Differential Equations ICOSAHOM 2018*.
 - [P31] Tracy Babb, Per Gunnar Martinsson, and Daniel Appelö. HPS accelerated spectral solvers for time dependent problems: Part 2, numerical experiments. In *Proceedings of: Spectral and High Order Methods for Partial Differential Equations ICOSAHOM 2018*.
 - [P32] Daniel Appelö, Fortino Garcia, and Olof Runborg. *WaveHoltz: Parallel and scalable solution of the Helmholtz equation*, pages 1541–1545. 2019.
 - [P33] D. Appelö, V. Bokil, Y. Cheng, and F. Li. Energy stable staggered high order finite differences for optical media. In *2019 International Applied Computational Electromagnetics Society Symposium (ACES)*, pages 1–2, April 2019.

- [P34] A Klaus, Oleksii Beznosov, James A Ellison, Desmond P. Barber, and Daniel Appelö. A pseudospectral method for solving the Bloch equations of the polarization density in e-storage rings. In *9th International Particle Accelerator Conference, IPAC2018, Vancouver, BC, Canada*, 2018.
- [P35] D. Appelö and S. Wang. An energy based discontinuous Galerkin method for acoustic-elastic waves. Extended abstract Waves 2017.
- [P36] D. Appelö, T. Hagstrom, and A. Semenov. An energy based discontinuous Galerkin method for Hamiltonian systems. Extended abstract Waves 2017.
- [P37] D. Appelö, T. Hagstrom, and A. Kornelus. Sobolev-dG a class of dG methods with tame CFL numbers. Extended abstract Waves 2017.
- [P38] D. Appelö and T. Hagstrom. A new discontinuous Galerkin formulation for wave equations in second order form. Extended abstract Waves 2015, 2015.
- [P39] A. Kornelus and D. Appelö. Application of the entropy viscosity method to Hermite methods for shock problems. Extended abstract Waves 2015, 2015.
- [P40] T. Colonius, A. Sinha, D. Rodríguez, A. Towne, J. Liu, G.A. Brès, D. Appelö, and T. Hagstrom. Simulation and modeling of turbulent jet noise. In Jochen Fröhlich, Hans Kuerten, Bernard J. Geurts, and Vincenzo Armenio, editors, *Direct and Large-Eddy Simulation IX*, ERCOFTAC Series, pages 305–310. Springer International Publishing, 2015.
- [P41] C. Y. Jang, D. Appelö, T. Colonius, T. Hagstrom, and M. Inkman. An analysis of dispersion and dissipation properties of Hermite methods and its application to direct numerical simulation of jet noise. In *18th AIAA/CEAS Aeroacoustics Conference (33rd AIAA Aeroacoustics Conference)*. American Institute of Aeronautics and Astronautics, 2013/10/31 2012.
- [P42] T. Hagstrom, D. Appelö, and C. Y. Jang. Hermite methods for hyperbolic-parabolic systems. In *Waves2011, Vancouver, Canada.*, 2011.
- [P43] D. Appelö, M. Inkman, T. Hagstrom, and T. Colonius. Hermite methods for aeroacoustics: Recent progress. In *17th AIAA/CEAS Aeroacoustics Conference (32nd AIAA Aeroacoustics Conference)*, Portland, Oregon, June 5-8, 2011, number AIAA-2011-2757, 2011.
- [P44] D. Appelö, T. Colonius, T. Hagstrom, and M. Inkman. Development of arbitrary-order Hermite methods for simulation and analysis of turbulent jet noise. *Procedia Engineering: IUTAM Symposium on Computational Aero-Acoustics for Aircraft Noise Prediction, University of Southampton, 29-31 March*, 2010.
- [P45] T. Colonius, D. Appelö, J. Nott, and J. Hall. Computational modeling and experiments of natural convection for a Titan Montgolfiere. In *AIAA Balloon Systems Conference, AIAA-2009-2806, Seattle 2009*, 2009.
- [P46] T. Hagstrom and D. Appelö. Experiments with Hermite methods for simulating compressible flows: Runge-Kutta time-stepping and absorbing layers. In *13th AIAA/CEAS Aeroacoustics Conference*, number 2007-3505, 2007.
- [P47] D. Appelö, S. Nilsson, A. N. Petersson, and B. Sjögreen. A stable finite difference method for the elastic wave equation on complex domains with free surface boundary conditions. In *Proceedings of Waves 2007, Reading, UK July 23-27*, 2007.
- [P48] D. Appelö and G. Kreiss. A new PML for the simulation of elastic waves in anisotropic media. In *The 7th Int. Conf. on Math. and Num. Aspects of Wave Propagation, Brown University, USA, June 20-24*, 2005.

- [P49] D. Appelö and T. Hagstrom. Construction of stable PMLs for general 2×2 symmetric hyperbolic systems. In *Proceedings of the Tenth International Conference on Hyperbolic Problems: Theory, Numerics, Applications, Osaka*, 2004.
- [P50] D. Appelö and G. Kreiss. Discretely nonreflecting boundary conditions for higher order centered schemes for wave equations. In Cohen et. al, editor, *Mathematical and Numerical Aspects of Wave Propagation, Proceedings Waves2003*, pages 130–125. Springer Verlag, 2003.
- [P51] D. Appelö and G. Kreiss. Evaluation of a well-posed perfectly matched layer for computational acoustics. In T.Y. Hou E. Tadmor, editor, *Hyperbolic Problems: Theory, Numerics, Applications, Proceedings of the Ninth International Conference on Hyperbolic Problems*, pages 285–294. Springer Verlag, 2002.
- [Thesis](#)
- [T52] D. Appelö. *Absorbing Layers and Non-Reflecting Boundary Conditions for Wave Propagation Problems*. PhD thesis, Royal Institute of Technology, October 2005.
- [T53] D. Appelö. Non-reflecting boundary conditions for wave propagation problems. Licenciates Thesis, Royal Institute of Technology, 2003.
- [T54] D. Appelö. PML-methods for the linearized Euler equations. Master’s thesis, Royal Institute of Technology, 2000.

Plenary and Invited Presentations

- What’s new with the wave equation?, The North American High Order Methods Conference (NAHOMCon) San Diego June 2-5 2019

Presentations at Professional Meetings

- WaveHoltz: Parallel and Scalable Solution of the Helmholtz Equation via Wave Equation Iteration, SCICADE July 2019, Innsbruck Austria.
- Parallel frequency domain electromagnetic solvers without agonizing pain, ICIAM 2019, Valencia Spain.
- Wasserstein Metric-Driven Deterministic and Bayesian Inversion for Elastic Wave Propagation, ICIAM 2019, July 2019, Valencia Spain.
- Energy Stable Staggered High Order Finite Differences for Optical Media, 2019 International Applied Computational Electromagnetics Society Symposium (ACES), Miami, FL
- Wasserstein Metric-driven Bayesian Inversion with Applications to Wave Propagation Problems, SIAM Conference on Mathematical & Computational Issues in the Geosciences (GS19), Houston, TX, 2019
- Numerical Homogenization for Waves using Hermite Methods, SIAM CSE Spokane 2019
- Hermite and dG methods for wave equations and their application to uncertain and inverse problems, WCCM, 2018, New York, USA, July 2018
- Hermite and dG methods for wave equations and their application to uncertain and inverse problems, ICOSAHOM, 2018, London UK, July 2018
- Energy based discontinuous Galerkin methods for complex materials, ICERM Workshop on Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials, Providence, USA, June 2018
- Globally Super-Convergent Conservative Hermite Methods for the Scalar Wave Equation. Banff workshop 17w5152 - Connections in Geometric Numerical Integration and Structure-Preserving Discretization, Banff, Canada, June 2017
- Three Tricks to Tame the CFL in Discontinuous Galerkin Methods. SIAM CSE, Atlanta, USA, March 2017

- An Energy Based Discontinuous Galerkin Method for Hamiltonian Systems. The Tenth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens GA, USA, April 2017
- An Energy Based Discontinuous Galerkin Method for Hamiltonian Systems. Waves 2017, Minnesota, USA, May 2017
- Energy Based Discontinuous Galerkin Methods for Nonlinear Waves. SIAM NLWCS, Philadelphia, USA, August 2016
- Energy Based Discontinuous Galerkin Methods for Propagation of Waves in Deterministic and Stochastic Problems, ICOSAHOM, 2016, Rio de Janeiro Brazil, 2016
- An energy-based discontinuous Galerkin discretization of the elastic wave equation in second order form, ECCOMAS Congress 2016, Crete, Greece, June 2016
- A Multi-Order Monte Carlo Discontinuous Galerkin Method for Wave Equations with Uncertainty. SIAM UQ 2016, EPFL, Switzerland, April 2016
- A new discontinuous Galerkin formulation for wave equations in second order form. Waves 2015, Karlsruhe, Germany, July 2015
- Upwind DG for Acoustic and Elastic Wave Equations, SIAM CSE, Salt Lake City, March 2015
- A Fourth Order Accurate Embedded Boundary Method for the Wave Equation in Second Order Form, SIAM CSE, Salt Lake City, March 2015
- Discontinuous Galerkin methods for Nonlinear Variational Wave Equations, AMS Western Spring Sectional Meeting, Albuquerque, NM, April 4-6, 2014
- Dissipative and Non-dissipative Hermite Methods for the Wave Equation, ICOSAHOM-2014 Salt Lake City, June 23-27 2014.
- Upwind DG for the wave equation in second order form, 11th International Conference on Theoretical and Computational Acoustics 10-14 March, 2014, Texas A&M University, College Station.
- P-adaptive Hermite methods for the Schrödinger equation. Eighth IMACS international conference on nonlinear evolution equations and wave phenomena: computation and theory Athens, GA, March 25, 2013.
- Hermite Methods for Hyperbolic Systems: Applications and Extensions. SIAM CS&E, Boston, February 26, 2013.
- Jet Noise DNS using Arbitrary-order Hermite Methods. SIAM CS&E, Boston, February 26, 2013.
- SIAM Annual meeting, Minneapolis, Minnesota, July 9-13, 2012. Invited mini symposium on modeling of rare events.
- Nucleation Events in Soft Condensed Matter Using the String Method, SIAM Annual meeting, Minneapolis, Minnesota, July 9-13, 2012, Invited mini symposium on modeling of rare events.
- Hybrid Hermite-Discontinuous-Galerkin Methods for Hyperbolic Systems, SIAM CSE 2011.
- The Minimum Energy Path to Membrane Pore Formation and Rupture, SIAM CSE 2011.
- Hermite Methods for Aeroacoustics: Recent Progress, 6 - 8 Jun 2011, 17th AIAA/CEAS Aeroacoustics Conference, Portland OR.
- Development of Arbitrary-Order Hermite Methods for Simulation and Analysis of Turbulent Jet Noise, IUTAM Symposium on Computational Aero-Acoustics for Aircraft Noise Prediction, University of Southampton, 29-31 March 2010.
- Super-Grid-Scale Models as Absorbing Layers for the Navier-Stokes Equations and Other Applications, SIAM Annual Meeting, San Diego, 2008.
- A General Perfectly Matched Layer Model for Hyperbolic Parabolic Systems, SIAM Annual Meeting, San Diego, 2008.
- Studies of Compressible Flows Using Arbitrary-order Hermite Discretizations, SIAM Annual Meeting, San Diego, 2008.

- A Stable Finite Difference Scheme for the Elastic Wave Equation on Complex Domains with Free Surface Boundary Conditions, 8th Int. Conf. on Math. and Numerical Aspects of Waves (Waves 2007), Reading, UK, 2007.
- Simulation of elastic waves in cylindrical shells, CAR Research and Technology Showcase, LLNL, 2007.
- A Stable Finite Difference Scheme for the Elastic Wave Equation on Complex Domains with Free Surface Boundary Conditions, ASCR Applied Mathematics Research PI Meeting, LLNL, May 22-24, 2006.
- A New PML for the simulation of elastic waves in anisotropic media, The 7th Int. Conf. on Math. and Num. Aspects of Wave Propagation, Brown University, USA, June 20-24, 2005.
- Energy Estimates for Perfectly Matched Layers, Tenth International Conference on Hyperbolic Problems, Theory, Numerics, Applications, Osaka, Japan, September 13-17, 2004.
- Discretely Nonreflecting Boundary Conditions for Higher order Centered Schemes for Wave Equations, The Sixth Int. Conf. on Math. and Num. Aspects of Wave Propagation, 2003, Jyväskylä University, Finland.
- Evaluation of a well-posed Perfectly Matched Layer for Computational Acoustics, Ninth Int. Conf. on Hyperbolic Problems Theory, Numerics, Applications, 2002, Caltech, Pasadena, CA, USA.

Colloquium and Departmental Seminars

- WaveHoltz: Parallel and Scalable Solution of the Helmholtz Equation via Wave Equation Iteration, Computational and Applied Math Seminar, Chalmers, Sweden, May 2019
- What's new with the wave equation?, Colloquium Oregon State University, April 2019
- What is new with the wave equation? Analysis and Applications Seminar University of Colorado Colorado Springs February 2019
- What is new with the wave equation?, Seminar in Numerical Analysis, June 2018, Royal Institute of Technology, Stockholm
- What is new with the wave equation?, Computational and Applied Math Seminar, June 2018, Chalmers Institute of Technology
- What is new with the wave equation?, Applied Math. Colloquium, March, 2018, Colorado School of Mines
- What is new with the wave equation?, Computational and Applied Math. Seminar, March, 2018, Arizona State University
- Energy Based Discontinuous Galerkin Methods, Workshop Seminar, July, 2017, Central China Normal University, Wuhan, China
- Globally Super-Convergent Conservative Hermite Methods for the Scalar Wave Equation, Workshop Seminar, July, 2017, Central China Normal University, Wuhan, China
- A Compact Fourth-Order-Accurate Embedded Boundary Method for the Wave Equation, Workshop Seminar, July, 2017, Central China Normal University, Wuhan, China
- High order accurate methods for time dependent problems, Colloquium, April 14, 2017, Rensselaer Polytechnic Institute
- High order accurate methods for time dependent problems, 2017, University of Colorado at Boulder
- Energy based discontinuous Galerkin methods, Colloquium, January 11 2017, Sandia National Labs
- Energy based discontinuous Galerkin methods, Colloquium, April 2017, Los Alamos National Labs
- Energy based discontinuous Galerkin methods, Colloquium, January 6 2017, Rice University
- Energy based discontinuous Galerkin methods, Colloquium, November 4 2016, Mathematics Department, Virginia Tech

- Energy based discontinuous Galerkin methods, Seminar, September 13, 2016, Lawrence Livermore National Laboratory
- Lagom Order Accurate Methods for Propagation of Waves in Deterministic and Stochastic Problems, Seminar in Numerical Analysis, June 3 2016, Royal Institute of Technology
- Lagom Order Accurate Methods for Propagation of Waves in Deterministic and Stochastic Problems, Seminar in Numerical Analysis, June 2016, Scientific computing seminar Uppsala university, Uppsala, Sweden
- Multi Level Monte Carlo Methods - Overview and Extensions, Statistics Colloquium UNM, April 2016
- High order accurate methods for time dependent problems. October 2015, UNM
- Hermite Methods for Nonlinear Conservation Laws, Team CHIDES take on the dichotomy of scales, SMU Mathematics Research Colloquium, Thursday, October 8, 2015
- A new discontinuous Galerkin formulation for wave equations in second order form, July 2015 TDB Uppsala University
- Hermite methods, basic elements, extensions and applications, CSRI Seminar Sandia Natl. Labs. Sep. 26 2012
- A pedestrians guide to Hermite methods, basic elements and some more sophisticated things, Scientific computing seminar Uppsala university, Uppsala, Sweden, March 20 2012.
- A pedestrians guide to Hermite methods, basic elements and some more sophisticated things, Numerical analysis seminar KTH, Stockholm Sweden, March 15 2012.
- A fourth-order accurate embedded boundary method for the wave equation, Mechanical engineering seminar Dec. 2 2011, NMSU.
- Arbitrary order Hermite methods for compressible flows, Mechanical engineering seminar Nov. 11 2011, UNM.
- Waves, Jet Noise and Membranes, Colloquium at the Department of Mathematics and Statistics, UNM, Sep. 30.
- Development of Arbitrary-Order Hermite Methods for Simulation and Analysis of Turbulent Jet Noise, Center for Applied Scientific Computing, LLNL, Livermore 15 June 2010.
- Finite Difference Approximations for Time-Dependent Solid-Mechanics, SMU Scientific Computing Seminar, Feb. 25. 2010.
- A Compact Fourth-Order-Accurate Embedded Boundary Method for the Wave Equation, Research colloquium Department of Mathematics, SMU, April 2009.
- A Compact Fourth-Order-Accurate Embedded Boundary Method for the Wave Equation, Colloquium at Department of Numerical Analysis and Computer Science, KTH Stockholm 2009.
- A Compact Fourth-Order-Accurate Embedded Boundary Method for the Wave Equation, Department of Scientific Computing, Uppsala University, Sweden, Oct. 2009.
- A Stable Finite Difference Scheme for the Elastic Wave Equation on Complex Domains with Free Surface Boundary Conditions, Colloquium University of New Mexico, April 17, 2008.
- A General Formulation of Perfectly Matched Layers for Mixed Hyperbolic-Parabolic Systems and its Application to Simulations of Viscous Compressible Flows, Colloquia at Department of Numerical Analysis and Computer Science, KTH Stockholm, Sep. 2007.
- A General Formulation of Perfectly Matched Layers for Mixed Hyperbolic-Parabolic Systems and its Application to Simulations of Viscous Compressible Flows, Department of Scientific Computing, Uppsala University, Sweden, Sep. 2007.
- Perfectly Matched Layers for Wave Propagation Problems on Unbounded Domains: General Formulation, Well-posedness and Stability, ICES seminar, University of Texas at Austin, Apr 11, 2006.
- A Stable Finite Difference Scheme for the Elastic Wave Equation on Complex Domains with Free Surface Boundary Conditions, Applied Math. Seminar Departement of Mathematics, UC Davis, Nov. 5 2007.

Departmental Topical Seminars

- An introduction to absorbing layers and non-reflecting boundary conditions, CU Boulder, 24 October 2017.
- Getting rid of the grid Part 1: Embedded boundary methods for wave equations, CU Boulder, September 12 2017.
- An energy based discontinuous Galerkin formulation for wave equations in second order form, August 17 2015.
- Stretching, damping and perfectly matched layers, Applied Math Seminar, Feb. 2 2015, UNM.
- A Compact Fourth-Order-Accurate Embedded Boundary Method for the Wave Equation, Applied Math Seminar, Jan. 26 2015, UNM.
- A new discontinuous Galerkin formulation for wave equations in second order form, Applied Math Seminar, Sep. 15 2014, UNM.
- Hermite Methods for Simulating Compressible Flows, Fluid Mechanics Research Conference, GALCIT, Caltech Nov. 10 2010.

Teaching

Doctoral Advisement

- Xi Chen (UNM), Numerical and Analytical Studies of Electromagnetic Waves: Hermite Methods, Supercontinuum Generation, and Multiple Poles in the SEM, 2012.
- Adeline Kornelus (UNM); Summer 2017; High order Hermite and discontinuous Galerkin Methods for Hyperbolic Problems.
- Oleksii Beznosov (UNM); Fall 2020 (Anticipated); High order methods for accelerators and wave propagation.
- Fortino Garcia; Spring 2020 (Anticipated); Part I: WaveHoltz a new iterative method for frequency domain problems. Part II: Numerical methods for quantum control.
- Allen Alvarez Loya; Spring 2021 (Anticipated); No working title yet.

Dissertation Committees

- Served as committee member on the dissertation committees of: Tracy Babb, Jeremy Thompson, Ming Gong, David Bizzozero, Dylan Abrahamsen, David Gunderman, Michael R. Payne, Eric Benner.

Masters Advisement

- Juan Pablo Madrigal Cianci, UNM 2017, Deterministic and Probabilistic Methods for Seismic Source Inversion.
- Evan Dye, UNM 2014, GPU implementations of Hermite Methods.

All below were co-advised with Prof. G. Kreiss.

- Mohammad Ali Etaati, KTH, Sweden, 2005. An Absorbing Layer for Non-linear Wave equations: First Order Formulation.
- Neda Sepasian, KTH, Sweden, 2005. An Absorbing Layer for Non-linear Wave equations: Second Order Formulation.
- Maria Fröling, KTH, Sweden, 2004. A Numerical Investigation of a Perfectly Matched Layer for Computational Aero Acoustics.
- Mohamad Motamed, KTH, Sweden, 2003. PML Methods for Aero Acoustics Computations.
- Svante Svensson-Frey, KTH, Sweden, 2003. A Comparison of Non-Reflecting Boundary Conditions for the Linearized Euler Equation.

Undergraduate Student Mentoring

Since Fall 2011 I have advised the following undergraduate students. The advisement ranges from giving advice on what classes to take to where to apply for a job or to graduate school to writing letters of recommendation etc.: Acosta Kristina, Black Sarah, Cartee Shannon, Dukes Timothy, McCullough Theresa, Sachs Lauren, Sharp Christopher, Ulibarri Steven, Young Reed, Rodrigo Osuna Orozco, Martinez Melanie, Chavez Christina, Castle Carlin and Areley Miramontes, Dominic Gomez, Donald, Aaron, Legits, Cairn Overturf, Jeanette Varela, Jorge Velarde

Classroom Teaching at CU Boulder

- Spring 2020 High Performance Computing, APPM 4720/5720.
- Fall 2019 APPM 1350: Calculus 1 for Engineers, 106 undergraduate students.
- Fall 2019 APPM 5600: Numerical Analysis 1, 35 graduate students.
- Fall 2018 Intro to numerical partial differential equations, APPM 6610, 10 graduate students.
- Fall 2018 Intermediate Numerical Analysis I, APPM/MATH 4650, 80 undergraduate students.
- Spring 2017 High Performance Computing, APPM 4720/5720, 12 undergraduate / graduate students.
- Fall 2017 Intermediate Numerical Analysis I, APPM/MATH 4650, 52 undergraduate students.

Classroom Teaching at UNM

- Spring 2017 Vector Analysis, MATH 311, 30 undergraduate students.
- Fall 2016 Vector Analysis, MATH 311, 23 undergraduate students.
- Introduction to Scientific Computing, CS/MATH 471, 22 students.
- Spring 2016 Numerical linear algebra, MATH 504, 12 students.
- Special Topic: Advanced Numerical Methods for ODE, MATH 579, 10 graduate students.
- Sem: Applied Math, MATH 679, 4 graduate students
- Fall 2015 Intro Numerical Computing, CS/MATH 375, 30 undergraduate students.
- Introduction to Scientific Computing, CS/MATH 471, 26 students.
- Sem: Applied Math, MATH 679, 2 graduate students
- Spring 2015 Linear Algebra with Apps, MATH 314, 31 undergraduate students.
- Special Topic: Numerical Analysis (Finite Element Analysis), MATH 579, 11 graduate students.
- Sem: Applied Math, MATH 679, 4 graduate students
- Fall 2014 Intro to Numerical Approx & Diff. Eq., MATH 505, 12 graduate students.
- Introduction to Scientific Computing, CS/MATH 471, 16 students.
- Sem: Applied Math, MATH 679, 2 graduate students
- Reading and Research, MATH 650, one graduate student.
- Fall 2013 Intro to Numerical Approx & Diff. Eq., MATH 505, 5 graduate students.
- Intro Numerical Computing, CS/MATH 375, 16 undergraduate students.
- Reading and Research, MATH 650, one graduate student.
- Spring 2013 Intro Numerical Computing, CS/MATH 375, 21 undergraduate students.
- Linear Algebra with Apps, MATH 314, 36 undergraduate students.
- Reading and Research, MATH 650, one graduate student.
- Fall 2012 Intro Numerical Computing, CS/MATH 375, 13 undergraduate students.
- Special Topic: Numerical Analysis (Computational Fluid Dynamics), MATH 579, 7 graduate students.
- Reading and Research, MATH 650, one graduate student.
- Summer 2012 MCTP mini course on numerical analysis, about 25 undergraduate students.
- Spring 2012 Intro Numerical Computing, CS/MATH 375, 20 undergraduate students.
- Reading and Research, MATH 650, one graduate student.

- Fall 2011 Intro Numerical Computing, CS/MATH 375, 14 undergraduate students.
 Linear Algebra with Apps, MATH 314, 44 undergraduate students.
[Teaching at Caltech](#)
- Spring 2009 Computational Fluid Dynamics Part 2, AE232. Instructor, 12 graduate and undergraduate students.
- Fall 2008 Computational Fluid Dynamics Part 1, AE232. Instructor, 12 graduate and undergraduate students.
[Teaching at Royal Institute of Technology](#)
- Spring 2006 Numerical Methods Basic Course I, 2D1210. Instructor, lectures, recitation and laboratory work, Lectures have about 80 students, recitations about 25.
- 2005 Math. Models, Analysis and Simulation, 2D1244, Recitations and laboratory work, about 25 students.
- 2005 Numerical Treatment of Diff. Eq, 2D1255, Recitations and laboratory work, about 25 students.
- 2001–2003 Applied Numerical Methods II, 2D1250, Recitations and laboratory work, about 25 students.
- 2002–2006 Numerical Methods, Basic Course I & II, 2D1210 & 2D1240, Recitations and laboratory work, about 25 students.

Curriculum Development

- Developed the course material for Special Topic: Finite Element Analysis MATH 579. Spring 2015.
- Modernized the course content of Math/CS 471 Introduction to Scientific Computing to include version control with git, openMP and MPI, Spring 2014-.
- Developed the course material for Special Topic: Numerical Analysis (Computational Fluid Dynamics), MATH 579. Fall 2012.
- Developed material for the one week introduction to numerical analysis. Summer 2012.
- Developed several new homework / project sets for Math 375, 2012.

Service

Editorships

- 2014–2017 Associate editor Rocky Mountain Journal of Mathematics. Handling 10-15 papers per year.

Refereeing for journals and other publications

- Journal of Scientific computing (1 per 3 months)
 Journal of Computational Physics (1 per 3 months)
 Communications in Mathematical Sciences, (1 per year)
 Wave Motion (1 per year)
 SIAM Journal on Scientific Computing (1 per year)
 SIAM Journal on Numerical Analysis (2 per year)
 Journal of Computational and Applied Mathematics (1 per year)
 AIAA Journal (1 per year)
 Applied Computational Mathematics (1 per year)

Reviews for funding organizations

- Computational math. NSF, Computational math. for Israel Science Foundation, ASFOR

Administrative work on Department, College, University committees

- 2019/20 Member, Graduate Committee
 2019/20 Member, Chair's Advisory

- 2019/20 Member, Ad hoc Multi-year Hiring Committee
- 2019/20 Member, Promotion and Tenure Committee
- 2019/20 Member, Post Tenure Review Committee
- 2019/20 Member, Arts & Science Council & Arts & Science Sub Committee, A&S budget committee
- 2018/19 Member of the graduate committee
- 2018/19 Member of College of Arts and Sciences budget committee
- 2018/19 Chair of Colloquium committee
- 2018/19 Chair of search committee
- 2018/19 Member of mid-review committee
- 2017/18 Member of the graduate committee
- 2015/16 Member of Center for Applied Scientific Computing Internal Advisory Board
- 2016/17 Faculty Senator
- 2016/17 Member of the Putnam preparation committee
- 2016/17 Member of the UNM-PNM Mathematics contest committee
- 2015/16 Member of the Undergraduate committee.
- 2014/15 Member of the NSF CC IIE Campus Networking Infrastructure grant Research Network Faculty Advisory Committee
- 2014/15 Computer use committee.
- 2013/14 Webpage committee.
- 2012/13 Member of the search committee for 2 applied math positions.

Outreach

From Calculus to Waves Outreach to Undergraduates at Navajo Technical University Crownpoint NM, Nov 2015

Other

- 2014–2016 Organizer of the Applied Math. Seminar. Hosted approximately 65 speakers.
- Spring 2013– Faculty sponsor of the UNM Lobo cycling team.
- 2009– I have organized more than 10 mini-symposiums at international conferences like SIAM Annual Meetings, SIAM Computational Science and Engineering, Waves, ICOSAHOM etc. I also served on the scientific committee for the 11th International Conference on Theoretical and Computational Acoustics 10-14 March, 2014, Texas A&M University, College Station, and I have reviewed proceedings for a handful other conferences.
- 2009– As a service to graduate students from other universities I have hosted Kenneth Duru, Stanford (visited me one week at Caltech), Kristoffer Virta, Uppsala University (visited UNM 2 x 3 months), Chang Young, SMU (visited UNM for one week), Kurt Stein (visited UNM one week) and John Lagrone SMU (visited UNM Nov-Dec 2015).