Matthew F. Causley

CONTACT INFORMATION

Michigan State University
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EDUCATION

Ph.D. Mathematical Sciences, New Jersey Institute of Technology, May 2011

PhD. Dissertation: *Asymptotic and numerical analysis of time-dependent wave propagation in dispersive dielectric media that exhibit fractional relaxation*

Advisor: Peter G. Petropoulos

B.S. Applied Mathematics, Kettering University, September 2006

Minor in Applied Physics (theoretical mechanics)

Electrical Engineering concentration

Undergraduate Dissertation: *Analysis and Correction of the Calculation Method of the Masterson Index*

Advisor: Brian J. McCartin

RESEARCH INTERESTS

Numerical analysis of PDEs, wave propagation, fast algorithms, numerical fractional calculus

PUBLICATIONS

Causley, M.F., and Christlieb, A., Higher order A-stable schemes for the wave equation using a successive convolution approach. *accepted, SIAM Journal of Numerical Analysis.*

Causley, M.F., Guclu, Y., Wolf, E. and Christlieb, A., Method of Lines Transpose: A Fast Implicit Wave Propagator. *submitted, Mathematics of Computation.*

Causley, M.F. and Petropoulos, P.G. On Numerically Solving the Cole-Cole Dielectric Model. *in preparation.*

Causley, M.F. and Petropoulos, P.G. On the Time-Domain Response of Havriliak-Negami Dielectrics. *Transactions on Antennas and Propagation*, 61 (6) (2013), 3182-3189.

Causley, M.F., Christlieb, A., Van Groningen, L. and Ong, B. Method of Lines Transpose: An Implicit Solution to the One Dimensional Wave Equation. *to appear, Mathematics of Computation.*

Causley, M.F., Petropoulos, P.G. and Jiang, S. Incorporating the Havriliak-Negami Dielectric Model in the FD-TD Method. *Journal of Computational Physics*, 230 (10) (2011) 3884-3899.

McCartin, B.J, and Causley, M.F. Angled Derivative Approximation of the Hyperbolic Heat Conduction Equations. *Journal of Applied Mathematics and Computation*, 182(2) (2006) 1581-1607.

CONFERENCE PROCEEDINGS

Kepler, G. et. al. Cardiovascular events associated with oral and IV-administered antibacterial agents. *Fourteenth Industrial Mathematical and Statistical Modeling Workshop for Graduate Students*, July 21-29, 2008.

Invited Talks

Higher order A-stable schemes for the wave equation through successive convolution. University of Michigan Flint. October, 2013; Flint, Michigan.

A Fast Implicit Maxwell Solver. Oak Ridge National Labs. June, 2013; Oak Ridge, Tennessee.

Solving the Wave Equation in Plasmas Using the Method of Lines Transpose. Kettering University. April, 2013; Flint, Michigan.

Contributed Talks and Minisymposia

Higher Order A-Stable Schemes for the Wave Equation. International Conference on Applied Mathematics, Modeling and Computational Science (AMMCS 2013). August, 2013; Waterloo, Ontario, Canada.

An Implicit Maxwell Solver based on the Method of Lines Transpose. SIAM CSE 2013. February, 2013; Boston, Massachusetts.

A Novel Implicit Maxwell Solver. 39th International Conference on Plasma Science (ICOPS). July, 2012; Edinburgh, Scotland.

A Numerical Method for Simulating EM Wave Propagation in Dielectrics that Exhibit Fractional Relaxation. SIAM Annual Meeting. July, 2010; Pittsburgh, Pennsylvania.

The Frequency-dependent Havriliak-Negami Dielectric Permittivity Model. 7th Annual Frontiers in Applied and Computational Mathematics (FACM). May, 2010; Newark, New Jersey.

Stability and Error Analysis of the Cole-Cole Dielectric Model. SIAM Annual Meeting. July, 2009; Denver, Colorado.

Numerical Solution of the Hyperbolic Heat Conduction Equation by the Method of Angled Derivatives. Michigan Undergraduate Mathematics Conference. October, 2005; Flint, Michigan.

Poster Presentations

A Fast A-Stable Boundary Integral Solver for Maxwell's Equations. Presented at: The combined 19th IEEE Pulsed Power Conference (PPC) and the 40th IEEE International Conference on Plasma Science (ICOPS). June, 2013; San Francisco, California.

A Novel Implicit Maxwell Solver. Presented at: 39th International Conference on Plasma Science (ICOPS). July, 2012; Edinburgh, Scotland.

Stability and Phase Error Analysis of the Cole-Cole Dielectric Model. Presented at: Dana Knox Student Research Showcase. April, 2009; Newark, New Jersey.

Asymptotic Results for the Havriliak-Negami Dielectric Model. Presented at: 5th Annual Graduate Student Research Day. November, 2009; Newark, New Jersey.

Teaching Experience

Course Instructor, Michigan State University **2011 to present**

Calculus II (*Spring 2013*)

Numerical Analysis I (*Fall 2011, Fall 2012*)

Numerical Analysis II (*Spring 2012*)

Course Instructor, New Jersey Institute of Technology **2009 to 2010**

Linear Algebra (*Fall 2010*)

Calculus III (*Fall 2009*)

Teaching Assistant, New Jersey Institute of Technology **2006 to 2011**

Recitation Instructor, Honors Calculus I (*Fall 2006*)

Recitation Instructor, Honors Calculus II (*Spring 2007*)

Recitation Instructor, Calculus II (*Fall 2007*)

Math Senior Capstone Lab Assistant (*Spring 2008*)

Discussion leader for qualifying exam candidates (*Spring 2011*)

Tutor **2002 to 2008**

Private Tutor (Trigonometry). New Jersey Institute of Technology, (*Fall 2008*)

Tutor (Math and Physics). Center for Excellence in Teaching and Learning, Kettering University, (*Fall 2002 to Spring 2005*)

Discussion Leader, Pre-Calculus placement exam review session; Kettering University, (*Fall 2003*)

Mentoring

Co-mentor, Michigan State University **2011 to present**

Lee VanGroningen, PhD graduate. Thesis: *Implicit solutions to the wave equation based on the method of lines transpose.*

Eric Wolf, PhD candidate. Project: Implicit solutions for plasma simulations.

Hana Cho, PhD candidate. Project: Solutions to nonlinear parabolic systems using the method of lines transpose.

Phil Ammirato, Katie Eichinger, Alex Hegedus, Catherine Ross, and Rita Vander Stad. Summer 2012 research experience for undergraduates (REU). Project title: *An investigation towards embedded boundary methods for Maxwell's equations.*

Honors and Awards

American Presidential Fellowship	2006 to 2010
SIAM Student Chapter Certificate of Recognition	2010
New Jersey Institute of Technology Award for Outstanding Service	2009
Applied Mathematics Award (scholarship)	2006
Student Achievement Scholarship	2002 to 2006
College Reading and Learning Association (CRLA) Tutoring certification	2004

Professional Experience

Actuarial Co-op, **Towers Perrin**, Southfield, Michigan **2004 to 2006**

Provided consultation for self-insured health care organizations.

Constructed and enhanced actuarial exhibits, utilized in presenting self-insured retention and loss projection for captive funding.

Completed undergraduate thesis, in association with Kettering University.

Service

Co-Mentor, REU summer program, Michigan State University, 2012.

Student Seminar Chair and Organizer, New Jersey Institute of Technology, 2010-2011.

SIAM Student Chapter President, New Jersey Institute of Technology, 2008-2009.

Educational Chair. Kettering University chapter, ΛXA social fraternity, 2004.

Programming Languages

Programming Proficiency: MATLAB
Programming Familiarity: Python, C/C++, UNIX, Fortran, MPI, CUDA.
Mathematical Software: LaTeX, Maple, Mathematica