Curriculum Vitae - Jeffrey M. M. Connors
University of Connecticut - Avery Point
1084 Shennecossett Road, ACD 114C
Groton, CT 06340
e-mail: jeffrey.connors@uconn.edu
phone: (860) 405-9188

Research Interests

- numerical algorithms for fluid-fluid interaction, computing traveling waves, *a posteriori* error estimation, large eddy simulation, operator splitting methods, uncertainty quantification, generally numerical methods for differential equations

Education

- **Ph. D. in Mathematics** - University of Pittsburgh, 2006-2010.
  Advisor: William J. Layton.
  Dissertation: Partitioned time discretization for atmosphere-ocean interaction.
- **B. S. Engr. in Engineering Physics** - University of Pittsburgh, 1998-2003.

Academic and Professional Appointments

- **Associate Professor - University of Connecticut**
  Department of Mathematics, August 2020 - present.
- **Assistant Professor - University of Connecticut**
  Department of Mathematics, August 2013 - August 2020.
- **Post Doctoral Research Associate - Lawrence Livermore National Laboratory**
  Center for Applied Scientific Computing, August 2010 - July 2013.
  Scientific Mentor: Carol Woodward.
- **Andrew Mellon Predoctoral Fellow - University of Pittsburgh**
  August 2009 - April 2010.
- **Teaching Fellow - University of Pittsburgh**
  August 2008 - April 2009.
- **Teaching Assistant or Graduate Student Researcher - University of Pittsburgh**
  August 2006 - April 2008.

Teaching

Graduate Ph.D. advisees - University of Connecticut

- Kimberly Savinon - Ph.D. anticipated 2025
- Michael Gaiewski - Ph.D. anticipated 2024
- Robert Dolan - Ph.D. 2020.
- Abdou Alzubaidi (co-advised with Y. S. Choi) - Ph.D. 2018.
- Faisal Duraihem (co-advised with Y. S. Choi) - Ph.D. 2018.

Course intructor - University of Connecticut

- **PreCalculus**
- **Calculus I**
- **Multivariable Calculus**
- **Linear Algebra with Applications**
- **Elementary Differential Equations**
- **Introduction to Numerical Analysis I**
- **Introduction to Numerical Analysis II**
- **Introduction to Finite Element Methods I**
- **Introduction to Finite Element Methods II**
- **Computational Fluid Dynamics**

Funding

- *Analysis and Development of Novel Multirate Coupling Schemes based on Discontinuous-Galerkin-in-Time Methods*, J. M. Connors (PI), DOE/Sandia National Laboratory contract #2222794, December 2020 - September 2023. $77,348.

Publications

21. *A conservative discontinous Galerkin-in-time (DGiT) multirate time integration framework for interface-coupled problems with applications to solid-solid interaction and air-sea models*, J.M. Connors, J. Owen, P. Kuberry and P. Bochev, submitted.
20. *An H1-conforming solenoidal basis for velocity computation on Powell-Sabin splits for the Stokes problem*, J.M. Connors and M. Gaiewski, to appear in INJAM, 2024.
19. *A multirate discontinuous-Galerkin-in-time framework for interface coupled problems*, Jeffrey M. Connors and K. Chad Sockwell, SIAM Journal on Numerical Analysis, Vol. 60, N0. 5, 2022.
18. *An unconditionally-stable, high-order and flux-conservative fluid-fluid coupling method*, Jeffrey M. Connors and Robert D. Dolan, Journal of Computational and Applied Mathematics, Vol. 410, pp. 1-24, 2022.
17. *A steepest descent algorithm for the computation of traveling dissipative solitons*, Y. S. Choi and J. M. Connors, Japan Journal of Industrial and Applied Mathematics, Vol. 37, pp. 131-163, 2020.
16. *Stability of two conservative, high-order fluid-fluid coupling methods*, Jeffrey M. Connors and Robert D. Dolan, Adv. Appl. Math. Mech., Vol. 11, No. 6, pp. 1-52, 2019.
15. *A defect-deferred correction method for fluid-fluid interaction*, Mustafa Aggul, Jeffrey M. Connors, Dilek Erkmen and Alexander E. Labovsky, SIAM Jour. Num. Analysis 56(4):2484-2512, 2018.
14. *An ensemble-based conventional turbulence model for fluid-fluid interaction*, Jeffrey M. Connors, Int. J. Numer. Anal. Modeling, Vol. 15, No. 4-5, pp. 492-519, 2018.
13. *Calculation of errors for operator-split advection-diffusion calculations*, Jeffrey M. Connors, Jeffrey W. Banks, Jeffrey A. Hittinger and Carol S. Woodward, Computer Methods in Applied Mechanics and Engineering, Vol. 272, No. 15, 2014, pp. 181-197.
12. *A method to calculate numerical errors using adjoint error estimation for linear advection*, Jeffrey M. Connors, Jeffrey W. Banks, Jeffrey A. Hittinger and Carol S. Woodward, SIAM Jour. Num. Analysis, Vol. 51, No. 2, 2013, pp. 894-926.

11. A posteriori *error estimation via nonlinear error transport with application to shallow water*, Jeffrey W. Banks, Jeffrey A. Hittinger, Jeffrey M. Connors and Carol S. Woodward, Recent Adv. Sci. Comput. Appl., Contemporary Mathematics, Vol. 586, 2013, pp. 35-42.

10. *Multiphysics Simulations: Challenges and Opportunities*, David E. Keyes, ... , Jeffrey Connors, et. al., Int. J. High Perfor. Comput. Appl., Vol. 27, No. 1, 2013, pp. 4-83.

9. *Numerical error estimation for nonlinear hyperbolic PDEs via nonlinear error transport*, Jeffrey W. Banks, Jeffrey A. Hittinger, Jeffrey M. Connors and Carol S. Woodward, Computer Methods in Applied Mechanics and Engineering, Vol. 213-216, 2012, pp. 1-15.

8. *A fluid-fluid interaction method using decoupled subproblems and differing time steps*, Jeffrey M. Connors and Jason S. Howell, Numerical Methods for PDEs, Vol. 28, No. 4, 2012, pp. 1283-1308 .

7. *Decoupled time stepping methods for fluid-fluid interaction*, Jeffrey M. Connors, Jason S. Howell and William J. Layton, SIAM Jour. Num. Analysis, Vol. 50, No. 3, 2012, pp. 1297-1319.

6. *Stability of algorithms for a two domain natural convection problem and observed model uncertainty*, Jeffrey M. Connors and Benjamin Ganis, Computational Geosciences, Vol. 15, No. 3, 2011, pp. 509-527.

5. *On small-scale divergence penalization for incompressible flow problems via time relaxation*, Jeffrey M. Connors, Eleanor W. Jenkins and Leo G. Rebholz, Int. Jour. of Computer Mathematics, Vol. 88, No. 15, 2011, pp. 3202-3216.

4. *Partitioned time discretization for parallel solution of coupled ODE systems*, Jeffrey M. Connors and Attou Miloua, BIT, Vol. 51, No. 2, 2011, pp. 253-273.

3. *Convergence analysis and computational testing of the finite element discretization of the Navier-Stokes-alpha model*, Jeffrey M. Connors, Numerical Methods for PDEs, Vol. 26, No. 6, 2010, pp. 1328-1350.

2. *On the accuracy of the finite element method plus time relaxation*, William J. Layton and Jeffrey M. Connors, Mathematics of Computation, Vol. 79, No. 270, 2010, pp. 619-648.

1. *Partitioned time stepping methods for a parabolic two-domain problem*, Jeffrey M. Connors, Jason S. Howell and William J. Layton, SIAM Jour. Num. Analysis, Vol. 47, No. 5, 2009.

Presentations

37. *Multirate integration schemes for diffusive problems with interfacial coupling*, minisymposium talk at Coupled Problems 2023, June 2023.

36. *A discontinuous-Galerkin-in-time framework for multirate time integration of interface-coupled problems*, minisymposium talk at SIAM CSE 2023, March 2023.

35. *A discontinuous-Galerkin-in-time framework for multirate time integration of interface-coupled problems*, minisymposium talk at Joint Mathematics Meetings, January 2023.

34. *A discontinuous-Galerkin-in-time framework for multirate time integration of interface-coupled problems*, CSRI Seminar, Sandia National Laboratory, November 2022.

33. *A discontinuous-Galerkin-in-time framework for multirate time integration of interface-coupled problems*, minisymposium talk at 15th World Congress on Computational Mechanics, August 2022.

32. *A discontinuous-Galerkin-in-time framework for multirate time integration of interface-coupled problems*, minisymposium talk at Copper Mountain, April 2022.

31. *Iteratively partitioned, high-order, multirate time stepping for fluid-fluid interaction with flux conservation*, minisymposium talk at International Conference on Spectral and High Order Methods, Vienna, Austria (virtual format), July 2021.

30. *Iteratively partitioned, second-order, multirate time stepping for fluid-fluid interaction with flux conservation*, minisymposium talk at IX International Conference on Coupled Problems in Science and Engineering, Barcelona, Spain (virtual format), June 2021.

29. *A method for concurrent multirate fluid-fluid calculations on large coupling windows*, minisymposium talk at WCCM-ECCOMAS 2020, moved from Paris to virtual format, January 2021.

28. *Partitioned time stepping for coupled fluids*, Math and Physics Seminar, University of New Haven, New Haven, Connecticut, November, 2019.

27. *Partitioned time stepping with coupled fluids*, Center for Computing Research seminar, Sandia National Laboratory, New Mexico, August, 2019.

26. *Adaptive time stepping with two coupled fluids*, minisymposium talk at ICIAM 2019, Valencia, Spain, July, 2019.

25. *Adaptive time stepping with two coupled fluids*, minisymposium talk at Coupled Problems 2019, Sitges, Spain, June, 2019.

24. *Two conservative, high-order coupling methods for fluid-fluid interaction*, Computational Mathematics Seminar, University of Pittsburgh, 2019.

23. *Higher-order asynchronous coupling for fluid-fluid interaction*, KEYNOTE at WCCM XIII, New York City, NY, 2018.

22. *Conservative and stable asynchronous fluid-fluid coupling methods*, KEYNOTE at ECCM-ECFD, Glasgow, Scotland, 2018.

21. *An ensemble-based conventional turbulence model for fluid-fluid interaction*, NCTS Workshop on PDEs, National Tsing Hua University, Hsinchu, Taiwan, 2017.

20. *An ensemble-based conventional turbulence model for fluid-fluid interaction*, Colloquium - Department of Mathematics, Michigan Technological University, November, 2016.

19. *Ensemble variance calculation for fluid-fluid interaction*, Special Session in honor of Bill Layton's 60th birthday, 2016 Fall Western Section Meeting, Denver, CO.

18. *The nonlinear error transport method for ALE computations*, Special Session on Developments of Numerical Methods and Computations for Fluid Flow Problems, 2015 AMS Spring Western Section Meeting, Las Vegas, NV.

17. *Quantification of operator-splitting effects for advection-diffusion*, Computational Mathematics Seminar, University of Pittsburgh - Department of Mathematics, November 5, 2013.

16. *Finite volume adjoint error estimates for weak solutions*, minisymposium talk at the 2013 SIAM Conference on Computational Science and Engineering, Boston, MA, February, 2013.

15. *The error transport and adjoint methods of numerical error estimation*, minisymposium talk at the 2013 Joint Mathematics Meetings, San Diego, CA, January, 2013.

14. *Quantification of operator-splitting effects in finite volume calculations of advection-diffusion*, invited minisymposium talk at the 2012 SIAM Annual Meeting, Minneapolis, MN, July, 2012.

13. *An adjoint error estimation technique using finite volume methods for hyperbolic equations*, invited minisymposium talk, SIAM Conference on Uncertainty Quantification, Raleigh, NC, April, 2012.

12. *Decoupling fluid-fluid calculations with partitioned time stepping*, invited talk at the ICiS Summer Workshop on Multiphysics Simulations: Challenges and Opportunities, Park City, UT, August, 2011.

11. *Adjoint error estimation for hyperbolic conservation laws and application to uncertainty quantification*, invited minisymposium talk at the US National Conference on Computational Mechanics, Univ. of Minnesota, July, 2011.

10. *Calculating numerical error in a quantity of interest for nonlinear algorithms applied to linear advection*, invited talk at the Bay Area Scientific Computing Day, May 8, 2011, Stanford University.

9. *Stable algorithms for a two domain natural convection problem and observed model uncertainties*, contributed talk at the SIAM Conference on Mathematical and Computational Issues in the Geosciences, March, 2011.

8. *Adjoint error estimation formulations for nonlinear algorithms applied to linear advection*, invited minisymposium talk at the SIAM Conference on Computational Science and Engineering, March, 2011, Reno, NV.

7. *Uncertainty quantification for a two domain natural convection problem*, invited minisymposium talk at the 2010 SIAM Annual Meeting, Pittsburgh, PA.

6. *Models of the coupled atmosphere and ocean*, invited talk at the CNA Working Group on Recent Advances in Analysis and Approximation of Fluids, Carnegie Mellon University, October, 2009.

5. *Partitioned time stepping techniques for fluid-fluid interaction*, invited talk for the Computational Mathematics Seminar, University of Pittsburgh, October, 2009.

4. *Partitioned time stepping algorithms for a parabolic problem on two subdomains*, contributed talk at the SIAM CSE09, Miami, FL, March 2009.

3. *Finite element analysis for a modified Navier-Stokes-alpha model*, invited talk at the ICAM Graduate Miniconference, Virginia Tech, February 2009.

2. *Partitioned time stepping methods providing stable decoupling of heat equations on two subdomains*, contributed talk at the RSV80 Conference in honor of Richard S. Varga's 80th birthday, Kent State University, October 2008.

1. *Convergence of NS-alpha model finite element discretizations*, invited talk at the SIMUMAT Summer School on Fluid Dynamics, Control and Optimization, CIEM, Castro Urdiales, Cantabria, Spain, July 2008.

Synergistic Activities

- **Scientific Mentor** for summer student (Nick Wilson - Clemson University) at Lawrence Livermore National Laboratory, summer 2011
- **Referee Service**
  - Advances in Applied Mathematics and Mechanics
  - Advances in Numerical Analysis
  - Applied Numerical Mathematics
  - Computer Methods in Applied Mechanics and Engineering
  - Computers and Mathematics with Applications
  - Journal of Computational and Applied Mathematics
  - Journal of Computational Physics
  - Journal of Mathematical Analysis and Applications
  - Journal of Numerical Mathematics
  - Numerical Methods for Partial Differential Equations
  - SIAM Journal on Numerical Analysis
  - SIAM Journal on Scientific Computing
- **Review author** for AMS Mathematical Reviews
- **Minisymposium co-organizer**
  - *Model Coupling: Challenges and connections for climate and mechanics* at USNCCM 16, July 2021.

  - *A Posteriori Error Estimation for Convection Dominated PDEs* at the SIAM 2013 Conference on Computational Science and Engineering.
  - *Advances in Theory and Application of Operator Splitting Methods* at the SIAM Annual Meeting 2012.

- **Session chair** at the SIAM Conference on Mathematical and Computational Issues in the Geosciences 2011

Awards

- **NSF Postdoctoral Fellowship**: awarded in 2010 - declined award for LLNL postdoc
- **SIMUMAT Summer School acceptance and funding**: July 2008
- **University Scholar** (merit based undergraduate scholarship): 1998 - 2003

Computing
MatLab, FreeFEM++, C, Maple, MPI, *hypre*, Fortran

Professional Societies

- Society for Industrial and Applied Mathematics
- American Mathematical Society