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Education

1983 B.S., Mechanical Engineering, University of Illinois at Urbana-Champaign,
1985 M.S., Mechanical Engineering, University of Illinois at Urbana-Champaign,
1988 Ph.D., Mechanical Engineering, University of Illinois at Urbana-Champaign.

Appointments

2012-2018 Director of Undergraduate Studies,
2012-2017 Associate Chair,
2010- Concurrent Professor, Dept. Applied and Computational Math. and Statistics, Univ. Notre Dame,
2009 Visiting Scientist, Chinese Academy of Sciences,
2008- Professor, Dept. Aerospace and Mechanical Engineering, University of Notre Dame,
2008-2010 Concurrent Professor, Dept. Mathematics, University of Notre Dame,
2006-2008 Concurrent Associate Professor, Dept. Mathematics, University of Notre Dame,
2006-07 Kaneb Faculty Fellow, University of Notre Dame,
2005 Visiting Scientist, Argonne National Laboratory,
1998-2003 Special Programs Guest, Los Alamos National Laboratory,
1995-2008 Associate Professor, Dept. Aerospace and Mechanical Engineering, University of Notre Dame,
1995 AFOSR Summer Faculty Research Associate, Wright Lab., Eglin AFB, Florida,
1990-91 NASA-ASEE Summer Faculty Fellow, NASA Lewis Research Center,
1989-95 Assistant Professor, Dept. Aerospace and Mechanical Engineering, University of Notre Dame,
1988-89 Visiting Assistant Professor, University of Illinois at Urbana-Champaign.

Honors, Awards, and Service

Editor-in-Chief, *Journal of Propulsion and Power*; AIAA Associate Fellow, NASA Innovative Technology Award, International Pyrotechnics Society Bursary Award, Ruth and Joel Spira Award for Excellence in Teaching, Kaneb Faculty Fellow, Faculty Award, Amoco-College of Engineering Outstanding Teacher of the Year Award, College of Engineering Outstanding Teacher of the Year Award, Dockweiler Award for Excellence in Undergraduate Advising, Provost Review Committee, Academic Council, First Year of Study Review Committee, Bookstore Advisory Committee, College Council, Engineering Dean Review Committee, Committee on Appointments and Promotion, Department Chair Review Committee, University of Illinois Bronze Tablet Award, Wapella High School Valedictorian, Member APS, SIAM, ASME, Combustion Institute, Tau Beta Pi, Pi Tau Sigma; Associate Editor, *Journal of Propulsion and Power*; Member, AIAA Propellants and Combustion Technical Committee, AIAA Committee on Standards in Computational Fluid Dynamics; Conference Organizer, Propellants and Combustion AIAA Aerospace Sciences Meeting, Second International Workshop on Model Reduction in Reacting Flow; President, Alumni Advisory Council, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign.

Ph.D. Students

M. J. Grismer (1994); K. A. Gonthier (1996); A. M. Smith (1997); S. Singh (2003); G. P. Brooks (2003); A. K. Henrick (2008); A. N. Al-Khateeb (2010); J. D. Mengers (2012); C. M. Romick (2015), Katherine Pielemeier (2023).

Selected Publications

- Powers, J. M., 2024, *Mechanics of Fluids*, Cambridge University Press, Cambridge, UK.
- Zahr, M. J., and Powers, J. M., 2021, "High-order resolution of multidimensional compressible reactive flow using implicit shock tracking," *AIAA Journal*, 59(1): 150-164.
- Shabouei, M., Subber, W., Williams, C. W., Matous, K., and Powers, J. M., 2019, "Chemo-thermal model and Gaussian process emulator for combustion synthesis of Ni/Al composites," *Combustion and Flame*, 207(9): 153-170.
- Powers, J. M., 2016, *Combustion Thermodynamics and Dynamics*, Cambridge University Press, New York.
- Powers, J. M., and Sen, M., 2015, *Mathematical Methods in Engineering*, Cambridge University Press, New York.
- Romick, C. M., Aslam, T. D., and Powers, J. M., 2015, Verified and validated calculation of unsteady dynamics of viscous hydrogen-air detonations, *Journal of Fluid Mechanics*, 769: 154-181.
- Powers, J. M., Paolucci, S., Mengers, J. D., and Al-Khateeb, A. N., 2015, Slow attractive canonical invariant manifolds for reactive systems, *Journal of Mathematical Chemistry*, 53(2): 737-766.
- Mengers, J. D., and Powers, J. M., 2013, One-dimensional slow invariant manifolds for fully coupled reaction and micro-scale diffusion, *SIAM Journal on Applied Dynamical Systems*, 12(2): 560-595.
- Al-Khateeb, A. N., Powers, J. M., and Paolucci, S., 2013, Analysis of the spatio-temporal scales of laminar premixed flames near equilibrium, *Combustion Theory and Modelling*, 17(1): 76-108.
- Romick, C. M., Aslam, T. D., and Powers, J. M., 2012, The effect of diffusion on the dynamics of unsteady detonations, *Journal of Fluid Mechanics*, 699: 453-464.
- Al-Khateeb, A. N., Powers, J. M., and Paolucci, S., 2010, On the necessary grid resolution for verified calculation of premixed laminar flames, *Communications in Computational Physics*, 8(2): 304-326.
- Al-Khateeb, A. N., Powers, J. M., Paolucci, S., Sommesse, A. J., Diller, J. A., Hauenstein, J. D., and Mengers, J. D., 2009, One-dimensional slow invariant manifolds for spatially homogeneous reactive systems, *Journal of Chemical Physics*, 131(2): 024118.
- Powers, J. M., and Paolucci, S., 2008, Uniqueness of chemical equilibria in ideal mixtures of ideal gases, *American Journal of Physics*, 76(9): 848-855.
- Cochran, M. T., and Powers, J. M., 2008, Computation of compaction in compressible granular material, *Mechanics Research Communications*, 35(1-2): 96-103.
- Powers, J. M., 2006, Review of multiscale modeling of detonation, *Journal of Propulsion and Power*, 22(6): 1217-1229.
- Henrick, A. K., Aslam, T. D., and Powers, J. M., 2006, Simulations of pulsating one-dimensional detonations with true fifth order accuracy, *Journal of Computational Physics*, 213(1): 311-329.
- Powers, J. M., and Aslam, T. D., 2006, Exact solution for two-dimensional compressible reactive flow for verification of numerical algorithms, *AIAA Journal*, 44(2): 337-344.
- Powers, J. M., and Paolucci, S., 2005, Accurate spatial resolution estimates for reactive supersonic flow with detailed chemistry, *AIAA Journal*, 43(5): 1088-1099.
- Henrick, A. K., Aslam, T. D., and Powers, J. M., 2005, Mapped weighted essentially non-oscillatory schemes: achieving optimal order near critical points, *Journal of Computational Physics*, 207(2): 542-567.
- Powers, J. M., 2004, On the necessity of positive semi-definite conductivity and Onsager reciprocity in modeling heat conduction in anisotropic media, *Journal of Heat Transfer*, 126(5): 670-675.