

Brendan Keith

Contact: keith@ma.tum.de

Education

Ph.D. - UT Austin (2018).

Institute for Computational Engineering and Sciences
Computational Science, Engineering, & Mathematics

B.Math - University of Waterloo (2011).

Department of Applied Mathematics &
Department of Physics
Honours Applied Mathematics with Physics Option

M.S. - UT Austin (2015).

Institute for Computational Engineering and Sciences
Computational Science, Engineering, & Mathematics

B.Math - University of Waterloo (2011).

Department of Pure Mathematics
Honours Pure Mathematics

M.Sc. - McGill University (2013).

Department of Mathematics and Statistics
Applied Mathematics

Research

Postdoctoral Research Assistant - TU Munich

Supervisor: Barbara Wohlmuth (09/2018 - present)

Graduate Research Assistant - UT Austin

Supervisor: Leszek Demkowicz (08/2013 - 08/2018)

Graduate Research Assistant - McGill University

Supervisor: George Haller (09/2011 - 08/2013)

Teaching

Graduate Teaching Assistant - UT Austin

CSE 386M, Functional Analysis in Theoretical Mechanics (graduate course) Fall 2016

CSE 380, Tools and Techniques for Computational Science (graduate course) Fall 2015

M 408N, Differential Calculus for Science Fall 2014

Graduate Teaching Assistant - McGill University

Math 376, Honours Nonlinear Dynamics Fall 2012

Undergraduate Teaching Assistant - University of Waterloo

Math 124, Calculus and Vector Algebra for Kinesiology Fall 2010

Math 135, Algebra for Honours Mathematics Winter 2010 & Spring 2011

Math 136, Linear Algebra for Honours Mathematics Winter 2010 & Winter 2011

Math 137, Calculus 1 for Honours Mathematics Fall 2010

Math 138, Calculus 2 for Honours Mathematics Winter 2011

Math 239, Introduction to Combinatorics Fall 2009

Recent Awards

SIAM Student Certificate of Recognition for 2017

Computers and Mathematics with Applications Second Prize for “Best Mathematically Oriented Poster” at the 14th U.S. National Congress on Computational Mechanics, 2017.

University of Texas at Austin University Graduate Continuing Fellowship

University of Texas at Austin College Recruitment Fellowship Award

Authorship

Preprints

- (1) Drzisga, D., Keith, B., and Wohlmuth, B. (2019). *The surrogate matrix methodology: A reference implementation for low-cost assembly in isogeometric analysis*. (Submitted.)
- (2) Drzisga, D., Keith, B., and Wohlmuth, B. (2019). *The surrogate matrix methodology: Low-cost assembly for isogeometric analysis*. arXiv:1904.06971 [math.NA].
- (3) Drzisga, D., Keith, B., and Wohlmuth, B. (2019). *The surrogate matrix methodology: a priori error estimation*. arXiv:1902.07333 [math.NA].
- (4) Demkowicz, L., Gopalakrishnan, J., and Keith, B. (2018). *The DPG-star method*. arXiv:1809.03153 [math.NA].

Peer-Reviewed Journal Articles

- (5) Keith, B., Vaziri Astaneh, A., and Demkowicz, L. (2019). *Goal-oriented adaptive mesh refinement for discontinuous Petrov–Galerkin methods*. SIAM J. Numer. Anal. (To appear.)
- (6) Vaziri Astaneh, A., Keith, B., and Demkowicz, L. (2019). *On perfectly matched layers for discontinuous Petrov–Galerkin methods*. Comput. Mech., **63**(6), 1131–1145. DOI: 10.1007/s00466-018-1640-3.
- (7) Keith, B., Petrides, S., Fuentes, F., and Demkowicz, L. (2017). *Discrete least-squares finite element methods*. Comput. Methods Appl. Mech. Engrg., **327**, 226–255. DOI: 10.1016/j.cma.2017.08.043.
- (8) Keith, B., Knechtges, P., Roberts, N., Elgeti, S., Behr, M., and Demkowicz, L. (2017). *An ultraweak DPG method for viscoelastic fluids*. J. Non-Newton. Fluid Mech., **247**, 107–122. DOI: 10.1016/j.jnnfm.2017.06.006.
- (9) Fuentes, F., Keith, B., Demkowicz, L., and Le Tallec, P. (2017). *Coupled variational formulations of linear elasticity and the DPG methodology*. J. Comput. Phys., **348**, 715–731. DOI: 10.1016/j.jcp.2017.07.051.
- (10) Keith, B., Fuentes, F., and Demkowicz, L. (2016). *The DPG methodology applied to different variational formulations of linear elasticity*. Comput. Methods Appl. Mech. Engrg., **309**, 579–609. DOI: 10.1016/j.cma.2016.05.034.
- (11) Fuentes, F., Keith, B., Demkowicz, L., and Nagaraj, S. (2015). *Orientation embedded high order shape functions for the exact sequence elements of all shapes*. Comput. Math. Appl., **70**(4), 353–458. DOI: 10.1016/j.camwa.2015.04.027.

Other

- (12) Keith, B. (2018). *New ideas in adjoint methods for PDEs: A saddle-point paradigm for finite element analysis and its role in the DPG methodology*. PhD thesis. Austin, Texas: University of Texas at Austin.
- (13) Keith, B., Demkowicz, L., and Gopalakrishnan, J. (2017). *DPG* method*. ICES Report 17-25. The University of Texas at Austin.
- (14) Keith, B., Fuentes, F., and Demkowicz, L. (2015). *The Exact Sequence for Elements of All Shapes (ESEAS) software library*. URL: <https://github.com/libESEAS/ESEAS>.
- (15) Keith, B. (2014). *Lagrangian Coherent Structures in Three-dimensional Steady Flows*. Master’s Thesis. Montreal, Quebec: McGill University.
- (16) Robison[†], B. K. (2011). *The Wave Equation and Multi-Dimensional Time*. The Waterloo Mathematics Review, **1**(1), 32–42.

[†]Personal name legally changed by the Government of Ontario to Brendan Keith on February 22, 2012.

Academic Service

Peer Review (Journals)

Computer Methods in Applied Mechanics and Engineering
Computers and Mathematics with Applications
IMA Journal of Numerical Analysis
Mathematics of Computation

Peer Review (Funding Agencies)

National Science Center, Poland (Panel ST8)

Conference Organizing

Texas Applied Mathematics and Engineering Symposium (tames.io)

Student Societies

Vice-President: UT Austin SIAM chapter. (01/2018 - 08/2018)
President: UT Austin SIAM chapter. (09/2015 - 12/2017)
Treasurer: UT Austin SIAM chapter. (09/2013 - 08/2015)

Student Politics

Graduate Student Assembly Representative: UT Austin (09/2016 - 08/2017)
Graduate Student Council Member: McGill University (09/2012 - 08/2013)
Graduate Student Society Committee Member: McGill University (09/2012 - 08/2013)

Societal Membership

Canadian Applied and Industrial Mathematics Society
Society for Industrial and Applied Mathematics (SIAM)
United States Association for Computational Mechanics