Dr. Truman E. Ellis

CONTACT INFORMATION

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SUMMARY OF QUALIFICATIONS

Computational scientist with a background in aerospace engineering and an emphasis on advanced numerical methods. Exposure to commercial CFD/CAE solvers as well as experience developing research codes for a wide range of applications. Well developed programming and development skills (C++ and Python) with an affinity for clean, elegant solutions. Expertise using Linux on high performance computing systems. Excellent spoken and written communication skills and thrives in a team environment.

PROFESSIONAL EXPERIENCE

Postdoctoral Scientist – *Plasma Physics* 2016 to present
Electromagnetic Theory Group,
Sandia National Laboratory

- Developing highly scalable plasma physics simulations in C++ using Trilinos.
- Analyzing stabilized finite element methods and shock capturing for multi-fluid plasma equations.
- Contributing to a test harness for stochastic simulation codes using a new theory of stochastic Richardson extrapolation implemented in Python.
- Involvement with experimental studies of particle accelerator driven electromagnetic pulses and analysis of data collected.

Graduate Research Assistant – *Stabilized Finite Elements* 2010 to 2016
Institute for Computational Engineering and Sciences,
University of Texas at Austin

- Developed space-time and locally conservative discontinuous Petrov-Galerkin finite element methods for fluid flow applications.
- Solved problems related to Stokes flow, incompressible and compressible Navier-Stokes, and Euler equations with shocks.
- Extensive work with Camellia, a parallel C++ library built on Trilinos for rapid development of DPG problem formulations.
- Contributed to open source libMesh finite element library.

Graduate Student Researcher – *Shock Hydrocodes* 2008 to 2013
Institute for Scientific Computing Research,
Lawrence Livermore National Laboratory

- Worked in a small research group developing advanced finite element discretization methods for Lagrangian hydrodynamics.
- Improved staggered grid hydro algorithms in multi-material Arbitrary Lagrangian Eulerian codes.
- Wrote a prototype code in Matlab to explore the benefits of using high order finite element pairs.
- Extended Blast, the next iteration object oriented C++ shock physics code to axisymmetric problems.
- Implemented a smoothness indicator to isolate artificial viscosity to shocked and underresolved flow regions.
- Developed a Python-scriptable 2D plotting tool to interface with the research code.
- Contributed to open source MFEM finite element library.

Undergraduate Student Researcher – *Shock Tube Experiments* Summer 2007
Research Experience for Undergraduates, Aerospace Engineering,
University of Illinois at Urbana-Champaign

- Designed a series of experiments and set up a lab to study the Mount St. Helens lateral blast.
- Developed CAD designs of experimental apparatus and assisted with assembly.
- Performed numerical predictions of experimental results.

Education

The University of Texas, Austin **GPA:** 3.92

Ph.D., Computational Science Engineering and Mathematics, April 2016

- Thesis Topic: *Space-time Discontinuous Petrov-Galerkin Finite Elements for Transient Computational Fluid Dynamics*
- Advisors: Leszek Demkowicz, Robert Moser

California Polytechnic State University, San Luis Obispo **GPA:** 3.93

M.S., Aerospace Engineering, June 2010

- Thesis Topic: *High Order Finite Elements for Lagrangian Computational Fluid Dynamics*
- Advisors: Tzanio Kolev, Robert Rieben, Faysal Kolkailah
- *Summa cum Laude*, With Highest Honors in Engineering

B.S., Aerospace Engineering, June 2010

- Aeronautics specialization
- *Summa cum Laude*, With Highest Honors in Engineering

Refereed Journal Publications

T.E. Ellis, J. Chan, and L. Demkowicz (2016),
Robust DPG Methods for Transient Convection-Diffusion.
Lecture Notes in Computational Science and Engineering,
doi:10.1007/978-3-319-41640-3_6

T.E. Ellis, and L. Demkowicz (2014),
Locally Conservative Discontinuous Petrov-Galerkin Finite Elements for Fluid Problems.
Computers & Mathematics with Applications, doi:10.1016/j.camwa.2014.07.005

V. Dobrev, T.E. Ellis, Tz. Kolev and R. Rieben (2012),
High-order Curvilinear Finite Elements for Axisymmetric Lagrangian Hydrodynamics.
Computers & Fluids, doi:10.1016/j.compfluid.2012.06.004

V. Dobrev, T.E. Ellis, Tz. Kolev and R. Rieben (2011),
Curvilinear Finite Elements for Lagrangian Hydrodynamics.
International Journal for Numerical Methods in Fluids, doi:10.1002/fld.2366

Software Skills

Computer Programming:

- C++, Python, Lua, MATLAB, Mathematica, and others

Scientific Computing Libraries:

- Trilinos, FEniCS, libMesh, MFEM, NumPy, SciPy, and others

CFD / Engineering Software:

- Fluent, Gambit, SolidWorks, Pro/ENGINEER, and others

Research Interests

Computational fluid dynamics, shock physics, multi-phase flows, turbulence modeling, finite element methods, Lagrangian hydrocodes, computational plasma dynamics, magnetohydrodynamics, computational mechanics

Professional Development

- How to Effectively Mentor as a PI/Team Lead – Sandia, 2017
- EPSCoR Post-Doc Leadership Workshop – Sandia, 2017

Awards and Honors

- Awarded Computational Applied Math Fellowship – UT Austin, 2010 - 2014
- Graduated *Summa cum Laude* – Cal Poly, 2010
- Elected to President's Honors List – Cal Poly, 2005 - 2007
- Elected to Dean's List – Cal Poly, 2005 - 2008
- Litton Industries in Engineering Scholarship – Cal Poly, 2007 - 2008
- Accenture Outstanding AERO Award – Cal Poly, 2007
- Reinhold Aerospace Engineering Scholarship – Cal Poly, 2007
- Elected to Dean's List – Ventura College, 2002 - 2005
- Howe Heywood Mathematics Prize – Ventura College, 2005
- James and Ida Iliff Memorial Scholarship – Ventura College, 2005
- Alexis Dember Scholarship – Ventura College, 2005
- Alpha Gamma Sigma Scholastic and Service Award – Ventura College, 2003