

# David Andrs

2785 Eagle Dr, E207, Ammon, ID 83406  
Phone: (208) 709-6540 • E-mail: andrsd@gmail.com

## Education

- M.S. Applied Mathematics.** University of Texas at El Paso, 2008
- Ph.D. Computer Science.** University of West Bohemia, Pilsen, Czech Republic, 2007
- M.S. Computer Science.** University of West Bohemia, Pilsen, Czech Republic, 2003

## Experience

- R&D Engineer at INL *mid April 2010–present*  
Developing massively parallel multiphysics framework for solving coupled systems of partial differential equations using non-linear solvers and Jacobian-Free Newton Krylov methods in C++ – MOOSE.  
Developing a code for solving a thermomechanical contact problem using Mortar method in 2D.  
Design and development of nuclear power plant safety code – RELAP-7.
- Software Developer of hp-FEM in 3D *2006–March 2010*  
Developing a library for solving systems of PDE in 3D using hp-adaptivity, arbitrary level hanging nodes and multi-mesh assembling. Last two features are currently unique features (according to authors knowledge) in existing FEM codes. Responsibilities included software design, implementation, testing and verification of the code as well as solving real-world problems. Latest work included incorporation of non-linear solvers (currently Trilinos), implementing Jacobian-Free Newton-Krylov method, support for iterative solvers and development of parallel version.
- Software Developer for Pocket PC *2005–2008*  
Design and implementation for several smaller and larger applications for Pocket PC platform. Applications distributed as a freeware via `pda.jasnapaka.com` web pages. In 2008, projects transformed into open source projects. Work included communication with users, solving their problems, implementing new features, testing, development and design of the software.
- Software Developer *2003–2006*  
Part-time programmer at Altap s.r.o., Novy Bor, `www.altap.cz`. Responsible for developing plug-ins to handle 7zip compression, reading ISO image files. Work required to study specifications and implement the software accordingly, also using third-party libraries and incorporate them into the existing framework.

## Research Experience

- LDRD program, co-PI *Sep 2012–Oct 2013*  
MOOSE Capability Extension In Support of Full Core Modeling
- Post-doctoral position at Idaho National Lab *April 2010–August 2010*  
Thermomechanical contact problems using Mortar method in 2D.
- Post-doctoral position at University of Nevada, Reno *2009–Mar 2010*  
Adaptive hp-FEM on irregular meshes.

## Teaching Experience

- Instructor Spring 2009  
University of Nevada, Reno  
Course: Ordinary Differential Equations
- Teaching Assistant 2007–Spring 2008  
University of Texas, El Paso  
Courses: Math for Social Sciences 1, Math for Social Sciences 2

## Language Skills

- Czech**    mother tongue
- English**    advanced both in speaking and writing

## Technical

- **Languages:** C/C++ (fluent), Perl (fluent), Java, Fortran, bash
- **Applications:** Eclipse, cmake, make, gnuplot, paraview, gmsh, plain TeX, LaTeX, doxygen, bugzilla, SVN, git, Mercurial, TRAC
- **Operating systems:** Linux, MacOS X, Windows
- **Parallel:** OpenMP, MPI, TBB
- **Solvers:** Trilinos, UMFPACK, PARDISO, MUMPS, libMesh, PETSc

## Awards

- **Laboratory Director's Award.** Idaho National Laboratory, 2011

## Journal Articles

- L. Guo, H. Huang, D. Gaston, C. Permann, D. Andrs, G. Redden, C. Lu, D. Fox, and Y. Fujita. A parallel fully coupled fully implicit solution to reactive transport in porous media using preconditioned Jacobian-Free Newton-Krylov method. *Advances in Water Resources*, 53:101–108, March 2013.
- M. R. Tonks, P. C. Millett, P. Nerikar, D. Andersson, C. Stanek, D. Gaston, D. Andrs, and R. Williamson. Multiscale development of a fission gas thermal conductivity model: Coupling atomic, meso and continuum level simulations. *Journal of Nuclear Materials*, 2012. In progress.
- Michael R Tonks, Paul C Millett, Pankaj Nerikarb, David Andersson, Chris Stanek, Blas Uberuaga, Derek Gaston, David Andrs, and Richard Williamson. Effect of intergranular porosity on uo2 fuel performance: Coupling atomic, meso and continuum level simulations. *Internat. J. Solids Structures*, 2011. Submitted.

- R. L. Williamson, J. D. Hales, S. R. Novascone, M. R. Tonks, D. R. Gaston, C. J. Permann, D. Andrs, and R. C. Martineau. Multidimensional multiphysics simulation of nuclear fuel behavior. *J. Nucl. Mater.*, 423:149–163, 2012.
- M.R. Tonks, D. Gaston, P.C. Millett, D. Andrs, and P. Talbot. An object-oriented finite element framework for multiphysics phase field simulations. *Comp. Mat. Sci.*, 51(1):20–29, 2012.
- P. Solin, J. Cerveny, L. Dubcova, and D. Andrs. Monolithic discretization of linear thermoelasticity problems via adaptive multimesh hp-fem. *J. Comput. Appl. Math.*, 234:2350–2357, August 2010.
- P. Solin and D. Andrs. On scientific data and image compression based on adaptive higher-order fem. *Advances in Applied Mathematics and Mechanics*, 1(1):56–68, August 2009.
- Pavel Solin, David Andrs, Jakub Cerveny, and Miroslav Simko. Pde-independent adaptive hp-fem based on hierarchic extension of finite element spaces. *J. Comput. Appl. Math.*, 233:3086–3094, April 2010.

## Conference Papers

- S. R. Novascone, B. W. Spencer, D. Andrs, R. L. Williamson, J. D. Hales, and D. M. Perez. Results from tight and loose coupled multiphysics in nuclear fuels performance simulations using BISON. In *Proceedings of the International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*, Sun Valley, Idaho, May 5-9, 2013.
- J. D. Hales, D. Andrs, and D. R. Gaston. Algorithms for thermal and mechanical contact in nuclear fuel performance analysis. In *Proceedings of the International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*, Sun Valley, Idaho, May 5-9, 2013.
- S. R. Novascone, D. Andrs, B. W. Spencer, J. D. Hales, R. L. Williamson, and D. M. Perez. Fully vs. loosely coupled thermomechanics in nuclear fuels performance simulations using bison. San Francisco, CA, In progress.
- D. Gaston, C. Permann, D. Andrs, and J. Peterson. Hybrid parallelism for massive scale, fully coupled, fully implicit multiphysics simulation. In *SIAM Parallel Processing for Scientific Computing*, Savannah, GA, Feb 15–17 2012.
- S. R. Novascone, R. L. Williamson, J. D. Hales, M. R. Tonks, D. R. Gaston, C. J. Permann, D. Andrs, and R. C. Martineau. A Multidimensional and Multiphysics Approach to Nuclear Fuel Behavior Simulation. In American Nuclear Society, editor, *Proceedings of PHYSOR 2012*, Knoxville, Tennessee, April 15-20, 2012.
- D. Gaston, C. Permann, D. Andrs, J. Peterson, M. Tonks, J. Hales, R. Williamson, and L. Guo. Massively parallel multiphysics simulation using an object-oriented framework. In *The Second Annual CAES Workshop on Modeling, Simulation and Visualization*, Boise, ID, Sep 8-9 2011.
- J. Hales, D. Andrs, D. Gaston, S. Novascone, C. Permann, M. Tonks, and R. Williamson. Fully coupled, implicit, 3-d, multi-physics for analysis of nuclear fuel. In *11th US National Congress on Computational Mechanics*, USNCCM11, Minneapolis, MN, 2011.

## Miscellaneous

- D. Andrs and The University of Texas at El Paso. Mathematical Sciences. *Adaptive Hp-FEM for Elliptic Problems in Three Dimensions on Irregular Meshes*. The University of Texas at El Paso, 2008.
- M. W. Gee, G. A. Hansen, and D. Andrs. Moertel mortar methods package. <http://trilinos.sandia.gov/packages/moertel>.
- J. Ortensi, D. Andrs, A.A. Bingham, R.C. Martineau, and J.W. Peterson. Initial coupling of the relap-7 and pronghorn applications. Technical Report INL/EXT-12-27350, Idaho National Laboratory, October 2012.
- J. Ortensi, D. Andrs, A.A. Bingham, R.C. Martineau, and J.W. Peterson. Relap-7 and pronghorn initial integration plan. Technical report, Idaho National Laboratory (INL), 2012.
- D. Andrs, R. Berry, D. Gaston, R. Martineau, J. Peterson, H. Zhang, H. Zhao, and L. Zou. Relap-7 level 2 milestone report: Demonstration of a steady state single phase pwr simulation with relap-7. Technical report, Technical report, Idaho National Laboratory, 2012.