John G. Wohlbier
High Performance Computing Consultant
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Education and Training

- Ph.D. in Electrical and Computer Engineering, University of Wisconsin–Madison, May 2003.
- Master of Science in Electrical Engineering, University of Wisconsin–Madison, May 2000.
- Bachelor of Science in Electrical Engineering, University of Wisconsin–Madison, August 1993.

Appointments

2016–present: High Performance Computing Consultant, Ci Software Associates.
2005–2016: Technical Staff Member, Computational Physics and Methods (CCS-2), Los Alamos National Laboratory.
2003–2005: Agnew National Security Post-doctoral Fellow, High Power Electrodynamics Group (ISR-6), Los Alamos National Laboratory.
2003–2003: Postdoctoral Researcher, Department of Engineering Physics, University of Wisconsin, Madison.

Experience

- **High Performance Computing Consultant.** Performance engineering for US Navy computational fluid dynamics codes. Application of performance analysis tools including Allinea MAP, Open|SpeedShop, Scalasca, Score-p, TAU, and Ravel to diagnose performance issues and implement solutions to improve performance. Developed best practices guide for application of performance engineering methodologies to scientific codes. Worked on performance engineering of computational fluid dynamics miniapps on Intel Knight's Landing processors.
- **Multi-physics software development for high performance computing.** Active on several multi-physics code projects for high performance computing for 10

years. Physics include but are not limited to compressible hydrodynamics, radiation-matter coupling, and magnetohydrodynamics. Recent activities include coding and optimization for Intel Xeon Phi coprocessors and NVidia GPUs, and implementation of distributed memory parallel domain decomposition and parallel I/O for an unstructured tetrahedral mesh code. C++/C/Fortran. MPI/OpenMP/OpenCL/CUDA.

- **Project lead for "Multi-physics on multi-core".** Lead successful effort to develop multi-physics code for the Cell processor in the Roadrunner supercomputer era. Roadrunner was a radically different heterogeneous architecture that required simultaneous use of the three very different types of processors on the system. The compute engine on the Cell processor was a short vector processor similar to what is emerging in current Intel hardware, but had additional barriers to use such as the need to specifically issue direct memory accesses (DMA's) to load registers.

- **Data Science Consultant.** Consulted on several data science projects with data science company. Developed *R* based prediction models using large financial and demographic data sets. Name of data science company available upon request.

- **Post-doc and graduate student mentor.** Mentored two post-doctoral researchers, both of which are now productive and well respected staff scientists. Mentored and worked with several graduate students pursuing degrees in computational physics.

Publications

- N.R. Morgan, J. Waltz, D.E. Burton, M.R.J. Charest, T.R. Canfield, and J.G. Wohlbier, A point-centered arbitrary Lagrangian Eulerian hydrodynamic approach for tetrahedral meshes. *Journal of Computational Physics*, 290:239-273 (2015)

- J. Waltz, J.G. Wohlbier, L.D. Risinger, T.R. Canfield, M.R.J. Charest, A.R. Long, and N.R. Morgan, Performance analysis of a 3D unstructured mesh hydrocode on multi- and many-core architectures. *International Journal for Numerical Methods in Fluids*, 77:319-333 (2015).

- M.R.J. Charest, T.R. Canfield, N.R. Morgan, L.D. Risinger, J. Waltz, and J.G. Wohlbier. A high-order vertex-based central ENO finite volume scheme for three-dimensional compressible flows. submitted to *Computers & Fluids*, (2014).

- N.R. Morgan, J. Waltz, D.E. Burton, M.R.J. Charest, T.R. Canfield, and J.G. Wohlbier. A Godunov-like point-centered essentially Lagrangian hydrodynamic approach. *Journal of Computational Physics*, 281:614-652 (2014).

- J. Waltz, N.R. Morgan, T.R. Canfield, M.R.J. Charest, and J.G. Wohlbier, A nodal Godunov method for Lagrangian shock hydrodynamics on unstructured tetrahedral grids. *International Journal for Numerical Methods in Fluids*, 76:129-146 (2014).

- J. Waltz, T.R. Canfield, N.R. Morgan, L.D. Risinger, and J.G. Wohlbier. Manufactured solutions for the three-dimensional Euler equations with relevance to Inertial Confinement Fusion. *Journal of Computational Physics*, 267(15):196-209 (2014).

- J. Waltz, N.R. Morgan, T.R. Canfield, M.R.J. Charest, L.D. Risinger, and J.G. Wohlbier. A three-dimensional finite element arbitrary Lagrangian-Eulerian method for shock hydrodynamics on unstructured grids. *Computers & Fluids*, 92(20):172-187 (2014).

- J. Waltz, T.R. Canfield, N.R. Morgan, L.D. Risinger, and J.G. Wohlbier. Verification of a three-dimensional unstructured finite element method using analytic and manufactured solutions. *Computers & Fluids*, 81(20):57-67 (2013).

- M. Fatenejad, B. Fryxell, J. Wohlbier, E. Myra, D. Lamb, C. Fryer, C. Graziani. Collaborative comparison of simulation codes for high-energy-density physics applications. *High Energy Density Physics*, 9(1):63-66 (2013).

- T.O. Masser, J.G. Wohlbier, and R.B. Lowrie. Shock wave structure for a fully ionized plasma. *Shock Waves*, 21:367–381 (2011).

- R.G. McClarren and J.G. Wohlbier. Solutions for ion-electron-radiation coupling with radiation and electron diffusion. *J. Quant. Spectrosc. Radiat. Transfer*, 112:119–130 (2011).

- J.G. Wohlbier. Phase distortion mechanisms in linear beam vacuum devices. *IEEE Trans. Plasma Sci.*, Vol. 33, no. 3, 2005.

- J.G. Wohlbier, S. Jin, S. Sengele. Eulerian calculations of wave breaking and multivalued solutions in a traveling wave tube. *Physics of Plasmas* **12**, 023106 (2005).

- J.G. Wohlbier and J.H. Booske. Nonlinear space charge wave theory of distortion in a klystron. *IEEE Trans. Electron Devices,* Vol. 52, no. 5, 2005.

- A. Singh, J.E. Scharer, J.H. Booske, and J.G. Wohlbier. Second and third-order signal injection for nonlinear distortion suppression in a traveling wave tube. *IEEE Trans. Electron Devices,* Vol. 52, no. 5, 2005.

- A. Singh, J.G. Wohlbier, J.H. Booske, and J.E. Scharer. Experimental Verification of the Mechanisms for Nonlinear Harmonic Growth and Suppression by Harmonic Injection in a Traveling Wave Tube. *Phys. Rev. Lett.* 92, 205005 (2004).

- X. Li, J.G. Wohlbier, S. Jin, and J.H. Booske. Eulerian Method for Computing Multivalued solutions of the Euler-Poisson Equations and Application to Wave Breaking in Klystrons. *Phys. Rev. E* 70, 016502 (2004).

- J.G. Wohlbier and J.H. Booske. Mechanisms of Phase Distortion in a Traveling Wave Tube. *Phys. Rev. E* 69, 066502 (2004).

- J.G. Wohlbier, J.H. Booske, and I. Dobson. On the Physics of Harmonic Injection in a Traveling Wave Tube. *IEEE Trans. Plasma Sci.*, Vol. 32, No. 3, (2004).

- J.G. Wohlbier, I. Dobson, and J.H. Booske. Generation and growth rates of nonlinear distortions in a traveling wave tube. *Phys. Rev. E* 66, 56504 (2002).

- J.G. Wohlbier, J.H. Booske, and I. Dobson. The Multifrequency Spectral Eulerian (MUSE) Model of a Traveling Wave Tube. *IEEE Trans. Plasma Sci.* Vol. 30, no. 3, June 2002.

- T. Zhang, J.G. Wohlbier, K.D. Choquette, N. Tabatabaie. Microcavity Vacuum-Field Configuration and the Spontaneous Emission Power. *IEEE Journal on Selected Topics in Quantum Electronics.* Vol. 1, no. 2, pp. 601–605, 1995.