

## **Tian Wan**

University of Minnesota, 107 Akerman Hall  
110 Union St SE, Minneapolis, MN 55455  
Email: wan@aem.umn.edu  
612-232-4044 (Cell) 612-626-7792 (Work)

### **EDUCATION**

- \* Ph.D., University of Minnesota, Twin Cities, September 2007 (expected)  
Aerospace Engineering and Mechanics, Overall GPA: 3.8/4.0
- \* Master of Science, University of Minnesota, Twin Cities, April 2005  
Aerospace Engineering
- \* Bachelor of Science, University of Science and Technology of China, Hefei, China, May 2002  
Mechanical Engineering

### **EXPERIENCE**

- \*2003-Present. Research Assistant, National Hypersonics Research Center, Department of Aerospace Engineering and Mechanics, University of Minnesota, Twin Cities

#### Development of Multi-block and Unstructured Solver Using a Parallel GMRES Method. 2005-2007

Executed a project targets for a next-generation reacting flow simulation package.  
Performed turbulence modeling includes Spallart-Allmaras, k-omega and PDF.  
Developed the function of non-premixed fuel injection combustion.  
Performed combustion mechanism validation with CHEMKIN.  
Realized parallel GMRES method using the numerical library PETSc.  
Computed successfully (compared with experiments) the scramjet combustion with injection, MHD power production with alkali seed injection.

#### Development of an Object-Oriented Computer Aided Engineering (CAE) Software in C++. 2005-2006

Graphical user interface (GUI) was implemented using Qt 4 and Qt script.  
Grid and CAD visualization using OpenGL; implemented view-world transformations such as camera translation, rotation and zooming, as well as color, lighting and material property of primitives.  
Full scale experience including Qt Designer and XML format user interface files.  
Multi-threaded, multi-process; time-consuming functions are put into new threads.  
Has a command-line version written in scripting language Python.

#### Simulation of Flows Around Complex Geometry Using CFX, Fluent and ANSYS. 2005

CAD models generated with ANSYS Workbench.  
Conducted CFD simulations using CFX and Fluent to solve engineering problems.  
Finite-element simulations on multiphase heat transfer using ANSYS.

#### Enhanced Reentry Vehicle Performance Through Power Extraction and Plasma Control. 2004-2005

Developed a computational tool which predicts the power generation by electrodes on a re-entry vehicle.  
Designed and implemented an electric-magnetic model based on simplified Maxwell's equations.  
Performed numerical analysis on the electrodes design, together with the validation of the model.  
Developed reaction mechanism for air-alkali seeding reaction mechanism.  
Provided the software to a local company, together with consultancy and documentation on its usage.

- \* 06/2005-07/2005, 06/2006-07/2006. English Interpreter. Jiu Tian Powder Metallurgy Incorporation. Hubei, China
- \* 2002-2003. Teaching Assistant. Department of Aerospace Engineering and Mechanics, University of Minnesota, Twin Cities. Related classes: Hypersonic Aerodynamics, Statics and Dynamics, Deformable Body Mechanics  
Responsibilities include grading, exam preparation, office hours, study hall and presentation.
- \* 2001, Summer. Internship. National shipbuilding center, 9<sup>th</sup> lab. Wuxi, China

## PUBLICATIONS AND PRESENTATIONS

1. T. Wan, G. Candler, S. Macheret, M. Shneider and R. Miles, "CFD Modeling and Simulations of MHD Power Generation During Re-Entry", AIAA 2004-2562. (presented)
2. T. Wan, R. Suzuki, G. Candler, S. Macheret and M. Shneider, "Three Dimensional Simulation of Electric Field and MHD Power Generation During Re-Entry", AIAA 2005-5045. (presented)
3. T. Wan and G. Candler, "Computational Simulations of Magnetohydrodynamic Acceleration Experiments Using Newton-Krylov-Schwarz Method", AIAA 2007-393. (presented)
4. I. Nompelis, T. Wan and G. Candler, "Investigation of Hypersonic Double-Cone Flow Experiments at High Enthalpy in the LENS Facility", AIAA 2007-203.
5. T. Wan and G. Candler, "High-performance Parallel Implicit Computations of Three-Dimensional Supersonic Magnetohydrodynamics Using PETSc Library", AIAA 2007-4367. (presented)
6. I. Nompelis, T. Wan and G. Candler, "Performance Comparisons of Parallel Implicit Solvers for Hypersonic Flow Computations on Unstructured Meshes", AIAA 2007-4334.
7. T. Wan and G. Candler, "Computational Analysis of a Scramjet Driven MHD Electric Power System", AIAA 2008-1071. (accepted)
8. T. Wan, G. Candler, S. Macheret and M. Shneider, "Three Dimensional Simulation of Electric Field and MHD Power Generation During Reentry", AIAA Journal 2006 (submitted).
9. T. Wan and G. Candler, "Computational Simulations of Magnetohydrodynamic Acceleration Experiments Using Newton-Krylov-Schwarz Method", AIAA Journal 2007 (in preparation)
10. T. Wan and G. Candler, "High-performance Parallel Implicit Computations of Three-Dimensional Supersonic Magnetohydrodynamics Using PETSc Library", AIAA Journal 2007 (in preparation)

## SELECTED COURSEWORK

Fluid Mechanics I, II, III, Chemical Kinetics, Plasma Technology, Thermal Design, Molecular Gas Dynamics, Computational Heat Transfer I, II, Computational Fluid Dynamics, Parallel High Performance Computation, The C++ Programming Language, Parallel Computer Organization, Iterative Algorithms for Large Sparse Systems

## COMPUTER SKILLS

Programming: Fortran, C, C++, Python, CVS, gdb, GNU make (cmake, gmake), bash.

Platforms: Unix, Linux, Windows

Programming Environments: Eclipse, Microsoft Visual Studio .NET, emacs

Engineering Packages: Pro/ENGINEER, ANSYS, CFX, Gridgen, Gridpro, Tecplot, Matlab, Mathematica.

Multimedia Packages: Adobe Photoshop CS, Adobe Premiere, Macromedia Dreamweaver/Flash/Fireworks.

## AWARDS

Jane Dunning Copper Fellowship, 2002-2003. Dept. of Aerospace Engr. & Mechanics, Univ. of Minnesota.

## REFERENCES

1. Graham Candler, Professor, candler@aem.umn.edu, 612-625-2364, 107 Akerman Hall, 110 Union st se, Minneapolis, MN, 55455
2. Ioannis Nompelis, Research associate, nompelis@aem.umn.edu, 612-626-7792, 107 Akerman Hall, 110 Union st se, Minneapolis, MN, 55455
3. Sean Garrick, Associate professor, garrick@me.umn.edu, 612-624-5741, Mechanical Engineering 245, University of Minnesota, Minneapolis, MN 55455