

Dr. Matthew Smith (李文修 博士)

Home Address: 高雄市左營區富國路 365 巷 28 號 3 樓

Phone number: (Mobile) 0910 861 070 (Home) +886-7-5571351

Email Address: archembaud@hotmail.com

Nationalities: Australia, Taiwan.

EDUCATION

University of Queensland, St. Lucia, Brisbane, Australia

Ph.D in Mechanical Engineering **2006-2008**

- Thesis entitled: “The True Direction Equilibrium Flux Method and its Applications” completed after 19 months of PhD study.
- Specialized in Computational Fluid Dynamics (CFD), Continuum Fluid Dynamics, General Gas Dynamics and Numerical Analysis.

University of Queensland, St. Lucia, Brisbane, Australia

M.Phil in Mechanical Engineering **2002-2003**

- Thesis entitled “Hybrid Methods in Near-Continuum Flows”
- Specialized in Rarefied Gas Dynamics (RGD), Computational Fluid Dynamics, and Numerical Analysis

University of Queensland, St. Lucia, Brisbane, Australia

B.Eng. (Honors) in Mechanical and Space Engineering **1998-2001**

- Specialized in numerical analysis of dynamic and gas dynamics systems.
- Completed two thesis projects in the final year related to numerical simulation of NS equations.

AWARDS & HONORS

Invited Speaker – Annual Meeting of the Mathematics Society (AMMS), Chiayi 2009

Invited Speaker – 5th joint Taiwan-Japan workshop on numerical analysis, Taipei 2009

Invited Speaker – HPC/APAC 2009, Kaohsiung 2009

Invited Attendee – 26th Int.Symposium on Rarefied Gas Dynamics, Japan 2008

Best Paper Award – Taiwan 15th National CFD Conference, Kaohsiung 2008

Australian Postgraduate Award 2007-2008

University of Queensland - Mechanical Engineering Prize 2002-2003

University of Queensland – Deans Award for Academic Excellence 2001

EXPERIENCE

National Center for High-performance Computing (NCHC), Taiwan

Research Associate

2008-Current

- Researcher within the Computational Applications Division (CAD)
- Represented the NCHC at several international conferences and meetings.
- Leader in research into GPU based kinetic theory research within NCHC, cooperated with a team of ~ 5 staff to develop solution approaches.
- CO-PI's of several major NSC and MoE projects (still ongoing) to the value of more than \$20 M NT / year.

National Chiao-Tung University (NCTU), Taiwan

Visiting Researcher

2007-Current

- Researcher within the Aerothermal and Plasma Physics Laboratory (APPL).
- Developing several numerical and kinetic theory related solution approaches for general plasma and CFD problems.
- Involved in collaborative research between several international and local institutions.

University of Queensland (UQ), Australia

Research Scholar

2006-2007 and 2001-2003

- Tutor and examiner for several (3rd and 4th year) fluid mechanics and thermodynamics subjects.
- Designed and constructed experimental equipment for thermodynamic experiments of the vortex tube.
-

Nordon Cylinders, Brisbane Australia

Lead Design and Production Engineer

2004-2006

- Responsible for design and manufacture of standard and heavy duty hydraulic equipment for various clients.
- Developed new methods for analysis and prediction of fatigue-related weld failures.
- Created software to perform rapid computational analysis of preliminary designs for quotation purposes.

Dominican School, Kaohsiung Taiwan

Homeroom and Mathematics Teacher

2003-2004

- Homeroom teacher and mathematics teacher for several year levels.
- Coordinator of annual school science fair.
- Coordinator of after school special education programs for mathematics and science.

Boeing Australia & Royal Australian Air Force (RAAF), Brisbane Australia.

Lead Simulation Engineer

2000-2001

- Leader of simulation project to model the airflow through the F-111 environmental control system.

JOURNAL PAPERS & PUBLICATIONS

Kuo, F.-A., Smith, M.R., Hsieh, C.-W., Lin, C.-Y., Chou, C.-Y. and Wu, J.-S., Hybrid Parallelization of a Rapid True Direction Kinetic Flux Scheme using MPI and GPU Computation, *J. Dist. & Parallel Comp.* (*submitted*), 2009.

Smith, M.R., Kuo, F.-A., Hsieh, C.-W., Yu, J.-P., Wu, J.-S. and Ferguson, A., Rapid Optimization of Blast Wave Mitigation Strategies using Quiet Direct Simulation and Genetic Algorithms, *Comp. Phys. Comm.*, (*Revised*) 2009.

Ferguson, A., Smith, M.R. and Wu, J.-S., Accurate True Direction Solutions to the Euler Equations Using a Uniform Distribution Equilibrium Method, *Phys. Review. E* (*submitted*), 2009.

Cave, H.M., Lim, C.-W., Jermy, M.C., Wu, J.-S., Smith, M.R. and Krumdieck, S.P., CVD flow field modeling using the Quiet Direct Simulation (QDS) method, *EuroCVD 17/CVD 17 Issue 8*, by Wörhoff, K, Ed. Swihart, M.T., Barreca, D., Wörhoff, K and Adomaitis, R., The Electrochemical Society, 2009.

Cave, H.M., Smith, M.R., Wu, J.-S., Krumdieck, S.P., Lim, C.-W. and Jermy, M.C., Axisymmetric simulations of Eulerian Gas Flows using the Quiet Direct Simulation, *Phys. Review. E* (*submitted*), 2009.

Smith, M.R., Cave, H.M., Wu, J.-S., Jermy, M.C. and Chen, Y.-S., An Improved Quiet Direct Simulation Method for Eulerian fluids using a second order scheme, *J. Comp. Phys.*, 228[6], 2009.

M. Smith, H. M. Cave, J.-S. Wu, and M. N. Macrossan. An approximate method for solving rarefied and transitional flows using TDEFM with isotropic mesh adaptation. In T. Abe, editor, *Proceedings of the 26th International Symposium on Rarefied Gas Dynamics* (AIP Conf. Proc. v1084), pages 371-376, Melville, New York, 2009. American Institute of Physics.

Smith, M.R., Macrossan, M.N. and Abdel-Jawad, M.M., Effects of Direction Decoupling in Flux Calculation in Finite Volume Solvers, *J. Comp. Phys.*, 227[8], 2008.

M. N. Macrossan, M. R. Smith, M.V. Metchnik, and P. A. Pinto. True direction flux method applications on rectangular 2D meshes. In M. S. Ivanov and A. K. Rebrov, editors, *Proceedings of the 25th International Symposium on Rarefied Gas Dynamics*, St. Petersburg, Russia, 21-28 July, 2006, pages 239-244. Siberian Branch of the Russian Academy of Sciences, 2007.

CONFERENCE PAPERS

Smith, M.R., Hung, C.-T., Lin, K.-M., Wu, J.-S. and Yu, J.-P., Development of a Semi-implicit Fluid Modeling Code using Finite-volume Method based on Cartesian Grids, *Conference on Computational Physics*, Kaohsiung Dec 15-19th, 2009.

Lin, K.-M., Smith, M.-R., and Wu, J.-S., Development of a large scale Fluid Modelling Code using a Finite Volume Method, *Conf. Comp. Phys.*, Kaohsiung Dec 15-19th, 2009.

Smith, M.R. and Wu, J.-S., Rapid Gas Flow Computation Using a High Resolution Kinetic Flux Scheme (Invited), *2009 Annual Meeting of the Mathematics Society* (中華民國數學年會) December 2009.

Ferguson, A., Smith, M.R. and Wu, J.-S., True Directional Equilibrium Fluxes using an Integral Particle Method, *PSFVIP-7*, Kaohsiung Nov 16th-19th, 2009.

Smith, M.R., Differential Evolution Algorithms in High Resolution CFD Applications (Invited), *2009 Taiwan-Japan Joint workshop on Numerical Analysis and Scientific Computation*, Taipei, Nov. 7-8th, 2009.

Smith, M.R., Cave, H.M., Kuo, F.-A., Lin, Y.-J., Wu, J.-S., Lim, C.-W. and Jermy, M.C., Overview and Outlook of Quiet Direct Simulation (QDS) Method as a Flow Solver (Invited), *The 5th Taiwan-Japan Workshop on Mechanical & Aerospace Engineering*, Nantou, October 21-24, 2009

Smith, M.R., Kuo, F.-A., Chou, C.-Y., Wu, J.-S. and Cave, H.M., Application of a Kinetic Theory based solver of the Euler Equations using GPU, *Parallel CFD 2009*, NASA Ames (San Francisco), May 2009.

Smith, M.R., Song, G.-Z. and Wu, J.-S., High resolution FVM simulation of competitive flora species (Invited), *HPC Asia 2009*, Kaohsiung, March 2 – 5th, 2009.

Smith, M.R., Cave, H.M. and Wu, J.-S., The Inclusion of Spatial Gradients into HLL Fluxes and Their Application (Invited), *HPC Asia 2009*, Kaohsiung, March 2 – 5th, 2009.

Smith et al. Simulation of Debris Formation and Movement Resulting from a Blast Wave in an Urban Environment (Best Paper Award), *15th National Taiwan CFD Conference*, Kaohsiung 2008.

Smith, M.R., Macrossan, M.N., Abdel-Jawad, M.M. and Ferguson, A., DSMC in the Euler Limit and its approximate Kinetic Theory Fluxes, *14th National Taiwan CFD Conference*, Nantou, 2007.

Smith, M. R. and Macrossan, M. N., Two Dimensional Isotropic Mesh Adaptation for viscous flow of a kinetic theory gas using TDEFM, *16th Australasian Fluid Mechanics Conference (AFMC)*, Gold Coast, Queensland, 3-7th December, 2007.