

# Curriculum Vitae

## JAMES C. SUTHERLAND

**OFFICE** University of Utah  
Department of Chemical & Fuels Engineering  
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**EDUCATION** Ph.D. Chemical Engineering, The University of Utah, May 2004  
Dissertation: "Evaluation of Large-Eddy Simulation Mixing and Reaction Models for Nonpremixed Combustion using Direct Numerical Simulation."  
Cumulative GPA: 3.96.

B.S. Chemical Engineering, The University of Utah, 1999. Graduated Cum Laude.  
Undergraduate Thesis: "A Study of the Chemistry of NO Formation and Reduction Using Methane, Carbon Monoxide, and Hydrogen as Reburning Fuels."  
Cumulative GPA: 3.88.

### TEACHING EXPERIENCE

- Recipient of the "Outstanding Teaching Assistant" award from the College of Engineering, University of Utah, 2003.
- Instructor for ChFEn 1703 - an introductory course for Chemical Engineering undergraduate students. Developed curriculum and spearheaded an effort to obtain 60 University site licenses for MATLAB. Student evaluations available upon request. For more details, see the website created I for this course at <http://www.inscc.utah.edu/~james/1703/index.htm>
- Participated in development of an online thermodynamics course, 2001.
- Teaching Assistant for an introductory course in Chemical Engineering, 2000.
- Teaching Assistant, Physics Department, University of Utah, 1996-1998.

### RESEARCH & PROFESSIONAL INTERESTS

- Numerical simulation and modeling of reacting flow systems including complex thermodynamics, heat and mass transport, and chemical kinetics.
- Nonpremixed and premixed combustion.
- Numerical methods and algorithms for simulation of systems of ODEs and PDEs.
- Large-scale, parallel numerical simulations, algorithm development & software engineering.
- Analysis of complex, multiphysics problems using state-of-the art modeling and simulation science.
- Applying fundamental research to solve practical engineering problems.

### PROFESSIONAL SERVICE

- Vice-Chair, Graduate Student Advisory Committee (1999-2000).
- Treasurer, student chapter of AIChE (1998-1999).
- Reviewer - Combustion Theory & Modeling.
- Reviewer - Journal of Computational Physics

### RELEVANT EXPERIENCE

- October, 2006 - present, Assistant Professor - The University of Utah

- August, 2004 – October, 2006, Post-doctoral research assistant – Thermal/Fluids Computational Engineering Sciences, Sandia National Laboratories (Albuquerque, NM).
- August 1999 - July 2004, Ph. D. Student & Student Intern – Combustion Research Facility, Sandia National Laboratories (Livermore, CA) & The University of Utah.
- 1998-1999, Research Assistant - University of Utah Advanced Combustion Group.

#### ACADEMIC AWARDS & HONORS

- Outstanding Teaching Assistant Award - University of Utah College of Engineering (2003).
- Sandia Graduate Fellowship Recipient (1999-2004).
- John Zink Scholar - Graduate fellowship awarded by the John Zink Company (2001).
- Oblad Award - presented by the ChFEn faculty to an outstanding senior each year (1999).
- All-American Award in Pistol Shooting (1999).
- Honors at Entrance Full Tuition Scholarship - University of Utah (1995).

#### PEER-REVIEWD PUBLICATIONS

- J. C. Sutherland, P. J. Smith, J. H. Chen, "A New Method for A Priori Evaluation of the Performance of Combustion Models," *Combustion Theory & Modelling* (to appear 2006).
- E. R. Hawkes, R. Sankaran, J. C. Sutherland, and J. H. Chen, "Scalar Mixing in Direct Numerical Simulations of Temporally-Evolving Plane Jet Flames with Detailed CO/H<sub>2</sub> Kinetics," 26<sup>th</sup> Symposium (International) on Combustion (to appear).
- J. C. Sutherland, P. J. Smith and J. H. Chen, "Quantification of Differential Diffusion in Nonpremixed Systems," *Combustion Theory and Modelling*, **9**:365-383 (2005).
- J. C. Sutherland and C. A. Kennedy, "Improved Boundary Conditions for Viscous, Reacting, Compressible Flows," *Journal of Computational Physics* **191**:502-524 (2003).

#### CONFERENCE PROCEEDINGS

- Stefan P. Domino, Greg J. Wagner, Amalia R. Black, Anay Luketa-Hanlin, J. C. Sutherland "Solution Verification for Turbulent Reacting CFD Codes" AIAA conference, Hawaii, April 2007 (to be presented).
- J.C. Sutherland "Large-scale, multiphysics simulations of reacting flow," Cantera Developer's Meeting, California Institute of Technology, April 24, 2006.
- Hawkes, E.R., Sankaran, R., Sutherland, J.C., Chen, J.H., (2006), "Terascale Direct Numerical Simulations of turbulent nonpremixed CO/H<sub>2</sub> plane jet flames," 11th SIAM International Conference on Numerical Combustion, Granada, Spain, Apr. 23-26, 2006.
- K. Ma, H. Yu, E. Kum, J. H. Chen, E. R. Hawkes, R. Sankaran, J. C. Sutherland, "Interactive visualization of terascale turbulent combustion simulation data," Super Computing 2005, Seattle, WA (November, 2005)
- J. C. Sutherland, D. White, "High Performance Computing and Visualization of Abnormal Hydrocarbon Pool Fire Scenarios," Super Computing 2005, Seattle, WA (November 2005).
- J. C. Sutherland, P. J. Smith, J. H. Chen and E. R. Hawkes, "A New Technique for Apriori Evaluation of Combustion Models," Western States Section meeting of the Combustion Institute, Stanford, CA (October, 2005).
- E. R. Hawkes, R. Sankaran, J. C. Sutherland, J. H. Chen, "Direct Numerical Simulation of Turbulent Combustion - Fundamental Insights Towards Predictive Models," Invited Plenary Lecture at SciDAC 2005, San Francisco, California, USA, (June, 2005). Published in *Journal of Physics: Conference Series* **16**:65-79 (2005).
- J. C. Sutherland and C. A. Kennedy, "Improved Boundary Conditions for Compressible, Viscous, Reacting Flows," SIAM Conference on Numerical Combustion, Sedona, AZ (May, 2004).
- J. C. Sutherland, P. J. Smith, and J. H. Chen, "Apriori Assessment of Subgrid Reaction Model Performance," SIAM Conference on Numerical Combustion, Sedona, AZ (May, 2004).

- J.C. Sutherland, "DNS & its Role in Validation of Mixing & Reaction Models," Workshop on Heat Transfer in Pool Fires, Salt Lake City, UT (April, 2004), (Invited talk).
- J. C. Sutherland, P. J. Smith and J. H. Chen, "Apriori Evaluation of Reaction Models for LES," Workshop on LES & SGS Modeling For Turbulent Mixing and Reactive Flows, Los Angeles, CA (December, 2003).
- J. C. Sutherland, P. J. Smith and J. H. Chen, "Quantification of Differential Diffusion in Nonpremixed Systems," Western States Section meeting of the Combustion Institute Los Angeles, CA (October, 2003).
- J. C. Sutherland, P. J. Smith and J. H. Chen, "DNS of a Nonpremixed CO/H<sub>2</sub> Jet using Detailed Chemistry - Toward Improved LES Models," 3<sup>rd</sup> Joint Meeting of the U.S. Sections of the Combustion Institute, Chicago, IL (March, 2003).