Varun Hiremath

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Fields of Interest

Computational Fluid Dynamics, Computational Combustion, High Performance Computing, Numerical Methods and Algorithms

Education

Cornell University, Ithaca, NY, USA
- ○ **Ph.D. in Aerospace Engineering** *Aug 2008 – Dec 2012*
  - Advisor: Professor Stephen B. Pope
  - GPA: 4.26/4.0
  - Minor: Computational Science and Engineering
- ○ **M.S. in Aerospace Engineering** *Aug 2008 – June 2011*

Indian Institute of Technology (IIT) Madras, Chennai, TN, India
- ○ **Dual Degree B.Tech. and M.Tech. in Aerospace Engineering** *July 2003 – July 2008*
  - Cumulative GPA: 9.32/10
  - Major (Aerospace Engineering) GPA: 9.52/10
  - Minor (Theoretical Computer Science) GPA: 10/10

Work Experience

GE Aerospace, Sammamish, WA, USA *Oct 2022 – present*
Senior Software Engineer
- Developing a High-Order CFD solver designed to work on hybrid CPU/GPU architecture.
- Actively involved in all aspects of design, development, testing, validation, and documentation efforts.

Siemens Digital Industries Software, Bellevue, WA, USA *June 2018 – Oct 2022*
Siemens (formerly CD-adapco), Lebanon, NH, USA *Jan 2013 – May 2018*
Senior Software Engineer
- Worked on the development of CFD simulation software, Simcenter STAR-CCM+, written in C++ and Java.
- Collaborated and worked with different teams focused on developing the core solver framework, physics models, and GUI components.
- Primarily worked in the reacting flow team on researching, implementing, and improving the performance of various combustion models.
- Worked on implementing Acoustic Modal Analysis post-processing tool in STAR-CCM+.
- Worked on porting STAR-CCM+ to use hybrid CPU/GPU computing.
- Gained experience with integrating and using various open-source scientific tools and libraries.

Additional Experience

Debian Developer *2006 – present*
- Developer for the Debian GNU/Linux project, a worldwide volunteer organization dedicated to producing a high-quality, free, Linux-based operating system. Maintaining several packages including various scientific computing, plotting and visualization packages.
- Experience with packaging, source code management, collaborative code development, version control systems, bug tracking systems, Linux operating system.
- Contributed source code to various open source projects.

Skills

Primary Languages: C++, Python

Secondary Languages: Fortran, C, Java, Shell Scripting, HTML, CSS

Scientific Packages: Sundials, SuiteSparse, PETSc, SLEPc, ISATCK, Chemkin

CFD Software: STAR-CCM+, Ansys Fluent, Space Claim, Ensight, Pointwise

Tools: Git, CMake, Make, Matlab

HONORS **AND AWARDS**	• **Siemens Excellent Performer Award**, Q2 FY20, 2020 • **Jayesh Prize** for outstanding presentation in the Cornell Fluid Dynamics Seminar, Cornell University, 2012 • **Graduate Research Fellowship**, Sibley School of Mechanical and Aerospace Engineering, Cornell University, 2008 • **Hindustan Aeronautics Limited Prize** for Securing Highest GPA, Aerospace Engineering, Indian Institute of Technology Madras, 2008 • **Institute Merit Prize** for Best Academic Record, Aerospace Engineering, Indian Institute of Technology Madras, 2004–2007

RESEARCH

Ph.D. Thesis, Cornell University *Aug 2008 – Dec 2012*

Computationally-Efficient Implementation of Combustion Chemistry

Large scale combined *Large-Eddy Simulation (LES)/Probability Density Function (PDF)* computations of turbulent reactive flows with realistic chemistry are computationally expensive. My thesis research work focused on developing computationally-efficient algorithms for implementing combustion chemistry in LES/PDF computations.

Doctoral Dissertation: Computationally-efficient and scalable implementation of chemistry in large-scale simulations of turbulent combustion, Cornell University, 2013.

○ **Parallel Implementation of Combustion Chemistry** *2011 – 2012*

Developed efficient and scalable parallel strategies for implementing chemistry in large-scale LES/PDF computations of turbulent reacting flows.

○ **Combined Dimension Reduction and Tabulation** *2008 – 2011*

Developed a combined dimension reduction and tabulation algorithm using the Rate-Controlled Constrained-Equilibrium (RCCE) dimension reduction method and In Situ Adaptive Tabulation (ISAT) for the computationally-efficient implementation of chemistry.

Some of these algorithms have also been incorporated and tested in commercial CFD packages like STAR-CCM+ and ANSYS Fluent.

JOURNAL
PUBLICATIONS

• V. Hiremath and S. B. Pope "A Study of the Rate-Controlled Constrained-Equilibrium Dimension Reduction Method and its Different Implementations", **Combustion Theory and Modelling**, 17(2) (2013) 260–293
• V. Hiremath, S.R. Lantz, H. Wang, S.B. Pope "Large-Scale Parallel Simulations of Turbulent Combustion using Combined Dimension Reduction and Tabulation of Chemistry", **Proceedings of the Combustion Institute**, 34(1) (2013) 205–215
• Z. Ren, G.M. Goldin, V. Hiremath, S.B. Pope "Simulations of a turbulent non-premixed flame using combined dimension reduction and tabulation for combustion chemistry", **Fuel**, 105 (2013) 636–644
• V. Hiremath, S.R. Lantz, H. Wang, S.B. Pope "Computationally-Efficient and Scalable Parallel Implementation of Chemistry in Simulations of Turbulent Combustion", **Combustion and Flame**, 159(12) (2012) 3096–3109
• Z. Ren, G.M. Goldin, V. Hiremath, S.B. Pope "Reduced Description of Reactive Flows with Tabulation of Chemistry", **Combustion Theory and Modelling**, 15(6) (2011) 827–848
• V. Hiremath, Z. Ren, S.B. Pope "Combined Dimension Reduction and Tabulation Strategy using ISAT-RCCE-GALI for the Efficient Implementation of Combustion Chemistry", **Combustion and Flame**, 158(11) (2011) 2113–2127
• V. Hiremath, Z. Ren, S.B. Pope "A Greedy Algorithm for Species Selection in Dimension Reduction of Combustion Chemistry", **Combustion Theory and Modelling**, 14(5) (2010) 619–652

TEACHING

Cornell University, Ithaca, NY, USA
• Intermediate Fluid Dynamics, Teaching Assistant *Spring 2012*
• Dynamics of Flight Vehicles, Teaching Assistant *Spring 2011*
• Fluids Laboratory, Teaching Assistant *Fall 2010*