

5 Education and University Integration

The Center has had a major impact on the University of Illinois in a variety of ways. Above all, it has engendered an unprecedented level of collaboration across disciplines and departments. Even within single disciplines, such as fluid dynamics or structural analysis, faculty collaboration across departmental lines has been enhanced enormously. As a result, the Center has become a model for other interdisciplinary, interdepartmental research initiatives. In addition, because of the broad applicability of the technologies it represents, CSAR has also provided leverage to, and benefited greatly from, many other separately funded programs on our campus, both individual faculty research grants and other large centers such as NCSA.

By hiring more than 65 new professional staff and postdoctoral associates during the first eight years of the program, the Center has significantly enlarged the local technical talent pool, providing a whole new set of collaborators for existing faculty and staff. The Center has also hosted a number of visitors, both long-term and short-term, and has organized a very popular seminar series that is designed specifically to reach out across disciplinary boundaries to enhance collaboration.

The Center spans nine academic units (Figure 5.1.1), and its recognition and influence are pervasive throughout the College of Engineering and beyond. We work very closely with NCSA, which contributes both research personnel and computer time toward our effort. Several key members of our research team are also research scientists at NCSA. It has been especially convenient to do initial code development locally on parallel systems at NCSA preceding full implementation on the remote ASC platforms.

Another major impact of the Center has been on graduate education and training. CSAR is playing a major role in educating a new generation of scientists and engineers prepared to work in computational simulation of complex systems by supporting more than forty graduate students at any given time. By virtue of this experience, the students we train are already attuned to the needs of interdisciplinary collaboration. The level of involvement by undergraduate students has been growing, especially in laboratory environments.

The Center has enhanced the awareness on our campus of computational simulation, and it has substantially increased the visibility and influence of our interdisciplinary Computational Science and Engineering (CSE) Program, which administratively houses the Center. The computationally-oriented, interdisciplinary educational program provided by CSE fits perfectly with the needs of CSAR, and the students in this program are ideally trained to participate in the research activities of the Center. CSE courses are specially designed to lower the usual barriers to interdisciplinary course work and enable students to master both applied and computational disciplines.

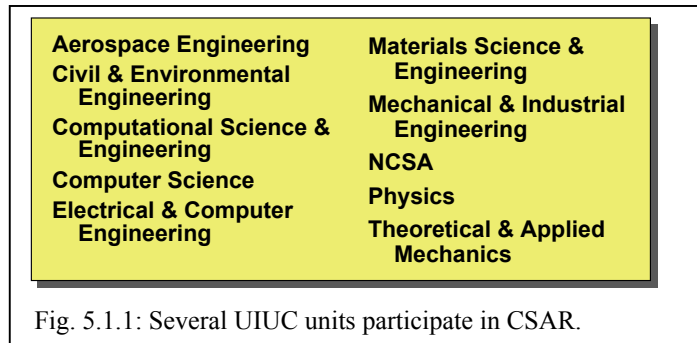


Fig. 5.1.1: Several UIUC units participate in CSAR.

Table 5.1
2004-05 CSAR Seminars

- Stephen Vavasis, Cornell University, “Near Linear Time Solution of Elliptic Differential Equations Using Support-Graph Preconditioners,” CS Colloquium, 10:00 A.M., Wednesday, October 26, 2005, 2405 Siebel Center.
- Jerrold Marsden, California Institute of Technology, “Geometric Fluid Mechanics: Lagrangian Coherent Structures and Swimmers”, Soo Lecture, 4:00 P.M., Thursday, October 6, 2005, Beckman Auditorium.
- Xiangmin (Jim) Jiao and Gengbin Zheng, UIUC/CSAR, “High-Level Software Architecture for Integrated Rocket Simulations,” CSE/CSAR Seminar, 12:00 Noon, Wednesday, May 18, 2005, 2240 DCL.
- Eric Shaffer, UIUC/CS, “Smoothing Large Meshes,” CSE/CSAR Seminar, 12:00 Noon, Wednesday, May 4, 2005, 2240 DCL.
- Jay Boris, U.S. Naval Research Laboratory, “Dust in the Wind: Challenges for Urban Aerodynamics,” CSE Symposium Keynote, 3:00 P.M., Thursday, April 21, 2005, 2240 DCL.
- Nikos Chrisochoides, College of William & Mary, “Parallel Unstructured Mesh Generation Using COTS Software,” CSE Symposium Keynote, 9:00 A.M., Thursday, April 21, 2005, 2240 DCL.
- Arif Masud, UIC, “A Multiscale Computational Framework with Applications to Carbon Nanotubes”, NCSA Seminar, 12:00 Noon, Thursday, April 21, 2005, 4169 BI.
- Stephen M. Foiles, Sandia National Laboratories, “Atomistic Determination of Grain Boundary Stiffness and Mobility”, MIE Seminar, 3:00 P.M., Friday, April 15, 2005, 2005 MEL.
- Phil Alexander, UIUC/CSAR, “Parallel Surface and Volume Mesh Smoothing,” CSAR Seminar, 12:00 Noon, Wednesday, April 13, 2005, 2240 DCL.
- Kalyan Nakshatrala, UIUC/CEE, “Stability of Coupling Algorithms,” CSE/CSAR Seminar, 12:00 Noon, Wednesday, April 6, 2005, 2240 DCL.
- Damrong Guoy, UIUC/CSAR, “Tools and Techniques for Mesh Repair in Rocket Simulation,” CSAR Seminar, 12:00 Noon, Wednesday, March 30, 2005, 2240 DCL.
- Luke Olson, Brown University, “Towards Efficient Solution Techniques for High-Order Methods: Highlights and Outlook,” CS Seminar, 10:00 A.M., Thursday, March 17, 2005, 2405 Siebel Center.
- Fatih Celiker, University of Minnesota, “Locking-Free Optimal Discontinuous Galerkin Methods for Timoshenko Beams,” CSAR Seminar, 12:00 Noon, Wednesday, March 16, 2005, 2240 DCL.
- Kevin Howard, Massively Parallel Technologies, Inc., “Theoretical Basis for an Expanded Amdahl’s Law and Its Impact on Parallel Algorithm Design”, NCSA Seminar, 4:00 P.M., Tuesday, March 15, 2005, 4405 SC.
- Mark Brandyberry and Court McLay, UIUC/CSAR, “Dataset Format and Assembly Tools, and the Automated Build and Test Cycle,” CSAR Seminar, 12:00 Noon, Wednesday, March 9, 2005, 2240 DCL.
- Xiangmin Jiao, UIUC/CSAR, “Face-Offsetting Framework for Dynamic Surface Meshes,” CSAR Seminar, 12:00 Noon, Wednesday, March 2, 2005, 2240 DCL.

- Robert Fiedler, UIUC/CSAR, "Performing Multiphysics Simulations with Rocstar," CSAR Seminar, 12:00 Noon, Wednesday, February 23, 2005, 2240 DCL.
- Michael Campbell and Gengbin Zheng, UIUC/CSAR, "Turing Tips and Tools," CSAR Seminar, 12:00 Noon, Wednesday, February 16, 2005, 2240 DCL.
- Babak Shotorban, UIUC/CSAR, "Modeling of Subgrid-Scale Effects on Particles in Large-Eddy Simulation," TAM Seminar, 12:00 Noon, Thursday, February 3, 2005, 100H Talbot Lab.
- K.C. Tang, UIUC/CSAR, "Modeling of Thermal Radiation in Solid Rocket Motors," CSAR Seminar, 12:00 Noon, Wednesday, January 19, 2005, 2240 DCL.
- Andreas Haselbacher, UIUC/CSAR, "Issues in Multiphysics Computations on Mixed Unstructured Grids," TAM Seminar, 12:00 Noon, Thursday, December 9, 2004, 100H Talbot Lab.
- John E. Pask, Lawrence Livermore National Laboratory, "Finite-Element Method for Large-Scale Ab Initio Electronic-Structure Calculations," MCC/NCSA Seminar, 2:00 P.M., Wednesday, December 1, 2004, 5602 BI.
- Luca Massa, UIUC/CSAR, "Using Heterogeneous Propellant Simulations to Create Subgrid Models for Navier-Stokes Analysis of Rocket Motor Chamber Flows," CSAR Seminar, 12:00 Noon, Wednesday, November 17, 2004, 2240 DCL.
- Bonnie J. Dunbar, NASA Johnson Space Center, "Space Exploration into the New Millennium: From LEO to Mars", AE Seminar, 4:00 P.M., Thursday, November 11, 2004, 1320 DCL.
- Merrill Beckstead, Brigham Young University, "Modeling Aluminum Combustion", MIE Seminar, 4:00 P.M., Tuesday, November 9, 2004, 218 MEB.
- T. G. Theofanous, University of California, Santa Barbara, "Compressible Multi-Hydrodynamics: Emergent Needs, Approach, and Status," CSE/CSAR/TAM Seminar, 2:00 P.M., Friday, October 22, 2004, 2240 DCL.
- Stephen Berry, University of Chicago, "Integrating Computational Tools for Simulations on Different Time Scales", NCSA/CS Seminar, 3:00 P.M., Wednesday, October 20, 2004, 3405 Siebel Center.
- Manish Gupta, IBM, "The IBM BlueGene/L Supercomputer", CS Seminar, 9:15 A.M., Tuesday, October 19, 2004, 2405 Siebel Center.
- Chung K. Law, Princeton University, "From Atomic to Cosmic: A Panoramic View of Combustion", MIE Seminar, 4:00 P.M., Tuesday, October 12, 2004, Beckman Institute Auditorium.
- Eliot Fang, Sandia National Laboratories, "Materials Modeling and Simulation at Sandia: Challenges and Progress", MIE Seminar, 4:00 P.M., Tuesday, October 5, 2004, 2005 ME Lab.
- Michael Kaneshige, Sandia National Laboratories, "Chemistry and Heat Transfer in Explosives: Improving Physical Models of Cook-Off Using in Situ Measurements", AE Seminar, 4:00 P.M., Monday, October 4, 2004, 103 Talbot Lab.