

## 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 60 new professional staff and postdoctoral associates during the first seven 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.

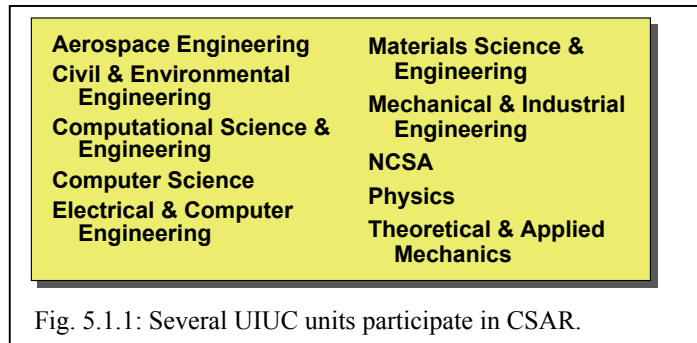


Fig. 5.1.1: Several UIUC units participate in CSAR.

**Table 5.1**  
**2003-04 CSAR Seminars**

- Babak Shotorban, University of Illinois at Chicago, "Large-Eddy Simulation of Practical Two-Phase Flows," CSAR Seminar, 12:00 Noon, Wednesday, September 29, 2004, 2240 DCL.
- Jeff Hiller, COMSOL, Inc., "Multiphysics Modeling with FEMLAB," COMSOL Seminar, 12:00 Noon, Tuesday, September 28, 2004, 5602 BI.
- Thom H. Dunning, University of Tennessee and Oak Ridge National Laboratory, "Opportunities and Challenges in High End Computing for Science and Engineering," NCSA Seminar, 11:00 A.M., Friday, September 17, 2004, 5602 BI.
- Sean P. Kearney, Sandia National Laboratories, "Laser-Based Temperature Imaging in Gas-Phase Flowfields," CSAR Seminar, 12:00 Noon, Wednesday, September 15, 2004, 2240 DCL.
- Andrew W. Cook, Lawrence Livermore National Laboratory, "The Mixing Transition in Rayleigh-Taylor Instability," AE/TAM Seminar, 4:00 P.M., Thursday, September 9, 2004, 103 Talbot Lab.
- Jing Wang, University of Minnesota, "Viscous Potential Flow with Pressure Correction," CSAR Seminar, 12:00 Noon, Wednesday, August 25, 2004, 2240 DCL.
- Shripad Thite, UIUC/CS, "Spacetime Meshing for Discontinuous Galerkin Methods," CS Seminar, 1:00 P.M., Tuesday, August 24, 2004, 3403 Siebel Center.
- Mark Shephard, RPI, "Mesh Modification for General Adaptive Mesh Control," CSE/CSAR Seminar, 10:00 A.M., Tuesday, July 27, 2004, 2240 DCL.
- Sebastien Candel, Ecole Centrale Paris and Institut Universitaire de France, "Structure and Dynamics of Cryogenic Flames at Supercritical Pressure," Aero/MIE/TAM/CSAR Seminar, 2:30 P.M., Tuesday, July 20, 2004, 103 Talbot Lab.
- Robert Fiedler, UIUC/CSAR, "Verification and Validation of the Rocstar Solid Propellant Rocket Simulation Code," CSAR Seminar, 2:00 P.M., Wednesday, June 30, 2004, 2240 DCL.
- Youhong Li, UIUC/CSAR, "Shock Impact on Heterogeneous Metals," CSAR Seminar, 12:00 Noon, Wednesday, June 23, 2004, 2240 DCL.
- Erik DeBenedictis, Sandia National Laboratories, "Taking Supercomputing to the Limits," CS Colloquium, 10:00 A.M., Wednesday, May 5, 2004, 2405 Siebel Center.
- Misha Kilmer, Tufts University, "Reuse-based Iterative Solvers for 3D Imaging in Diffuse Optical Tomography," CSE Seminar, 4:00 P.M., Tuesday, May 4, 2004, 2240 DCL.
- Sean Meyn, UIUC/ECE, "Phase Transitions and Metastability in Markovian and Molecular Systems," 3:30 P.M., Tuesday, May 4, 2004, 4405 Siebel Center.
- Michel Dubois, University of Southern California, "Are We Entering the Golden Age of Parallel Processing?," CS Colloquium, 4:00 P.M., Monday, May 3, 2004, 1320 DCL.
- Alla Sheffer, University of British Columbia, "Cross-Parameterization and Compatible Remeshing of 3D Models," Computer Graphics Seminar, 2:00 P.M., Thursday, April 29, 2004, 3405 Siebel Center.
- Karel Matous, UIUC/CSAR, "Is Hierarchical Multi-Scale Modeling of Inelastic Heterogeneous Solids Rocket Science?" CSAR Seminar, 12:00 Noon, Wednesday, April 28, 2004, 2240 DCL.
- Chris Johnson, University of Utah, "Problem Solving Environments and Visualization for Biomedical Applications," CSE Symposium Keynote, 3:00 P.M., Tuesday, April 27, 2004, 2240 DCL.

- Lori Freitag Diachin, Lawrence Livermore National Laboratory, "Developing Interoperable Meshing and Discretization Components," CSE Symposium Keynote, 9:00 A.M., Tuesday, April 27, 2004, 2240 DCL.
- Orion Lawlor, UIUC/CSAR, "Impostors for Parallel Interactive Computer Graphics," CSAR Seminar, 12:00 Noon, Wednesday, April 21, 2004, 2240 DCL.
- Stephen Bond, UIUC/CS, "Applications of Geometric Integration in Molecular Simulation," CS Colloquium, 4:00 P.M., Monday, April 19, 2004, 1320 DCL.
- Thomas Jackson, UIUC/CSAR, "Recent Advances in the Numerical Simulation of Heterogeneous Solid Propellant Combustion," CSAR Seminar, 12:00 Noon, Wednesday, April 14, 2004, 2240 DCL.
- Michael Campbell, UIUC/CSAR, "Performance Profiling and Tuning for CSAR Applications," CSAR Seminar, 12:00 Noon, Wednesday, April 7, 2004, 2240 DCL.
- Oren Livne, Stanford University, "Towards Bootstrap Algebraic Multigrid (BAM)," CS Colloquium, 11:00 A.M., Monday, April 5, 2004, 2405 Siebel Center.
- Damrong Guoy, UIUC/CSAR, "Meshing Activities in CSAR," CSAR Seminar, 12:00 Noon, Wednesday, March 31, 2004, 2240 DCL.
- Edgar Ramos, UIUC/CS, "On Delaunay-Based Mesh Generation," CS Colloquium, 4:00 P.M., Monday, March 29, 2004, 1320 DCL.
- Mark Brandyberry, UIUC/CSAR, "The Art of Software Testing," CSAR Seminar, 12:00 Noon, Wednesday, March 17, 2004, 2240 DCL.
- Andreas Haselbacher, UIUC/CSAR, "Higher-Order Spatial Discretization in the Unstructured Fluid Solver *Rocflu*," CSAR Seminar, 12:00 Noon, Wednesday, March 10, 2004, 2240 DCL.
- Craig Douglas, University of Kentucky and Yale University, "Virtual Telemetry for Dynamic Data-Driven Application Simulations," CSE Seminar, 2:00 P.M., Wednesday, March 3, 2004, 2240 DCL.
- David Padua, UIUC/CS, "Extending MATLAB for Parallel Programming," CSE/CSAR Seminar, 12:00 Noon, Wednesday, March 3, 2004, 2240 DCL.
- Tinsley Oden, University of Texas, Austin, "Estimation and Control of Modeling Error for Random Heterogeneous Materials," MIE Seminar, 4:00 P.M., Tuesday, March 2, 2004, 2005 ME Lab.
- Erik Luijten, UIUC/MATSE, "Geometric Cluster Algorithm for Interacting Fluids," NCSA/PECM Seminar, 1:00 P.M., Tuesday, March 2, 2004, 2269 BI.
- K.C. Tang, UIUC/CSAR, "Solid Propellant Combustion Modeling and Solid Rocket Motor Simulation," CSAR Seminar, 12:00 Noon, Wednesday, February 25, 2004, 2240 DCL.
- Anil Hirani, Caltech, "Exterior Calculus and its Applications in Mechanics and Computer Science," CS Colloquium, 10:00 A.M., Tuesday, February 24, 2004, 3405 Siebel Center.
- Scot Breitenfeld, UIUC/CSAR, "*Rocfrac* - CSAR's Explicit Finite Element Solids Solver," CSAR Seminar, 12:00 Noon, Wednesday, February 18, 2004, 2240 DCL.
- H. S. Udaykumar, University of Iowa, "A Cartesian Grid Method for Multimaterial Impact, Penetration and Void Collapse," TAM Seminar, 12:00 Noon, Thursday, February 12, 2004, 100H Talbot Lab.
- Inderjit Dhillon, University of Texas, Austin, "Fast Eigenvalue/Eigenvector Computation for Dense Symmetric Matrices," MCC Seminar, 11:00 A.M., Thursday, February 12, 2004, 1003 MRL.

- John Norris, UIUC/CSAR, “Graphical and Visualization Tools for the CSAR Researcher,” CSAR Seminar, 12:00 Noon, Wednesday, January 28, 2004, 2240 DCL.
- Luca Massa, UIUC/CSAR, “An Algorithm for the Simulation of Liquid-Gas Interface Problems and Its Application to Aluminum Combustion,” CSAR Seminar, 12:00 Noon, Wednesday, January 21, 2004, 2240 DCL.
- Yonggang Huang, UIUC/MIE, “Order-N Atomic-scale Finite Element Method in Multiscale Computation,” NCSA Seminar, 12:00 Noon, Wednesday, January 14, 2004, 4169 BI.
- James Ferry, UIUC/CSAR, “Three Multiphysics Themes: Interaction Paradigms, Equilibrium Methods, and Interpolation Schemes,” CSAR Seminar, 12:00 Noon, Wednesday, January 14, 2004, 2240 DCL.
- Bono Wasistho, UIUC/CSAR, “A Strategy for Modeling Turbulence and Heat Transfer in Rocket Flows,” CSAR Seminar, 12:00 Noon, Wednesday, December 17, 2003, 2240 DCL.
- Srinidhi Varadarajan, Virginia Tech, “System X: Building the Virginia Tech Supercomputer,” CSE/CSAR Noon Seminar, 12:00, Tuesday, December 16, 2003, 2240 DCL.
- Alireza Namazifard, UIUC/CSAR, “Stability Problems in High Pressure Response,” CSAR Seminar, 12:00 Noon, Wednesday, December 10, 2003, 2240 DCL.
- Xiaojian Wang, UIUC/CSAR, “Numerical Simulation of Heterogeneous Propellant Combustion by an Interface Capturing Method,” CSAR Seminar, 12:00 Noon, Wednesday, November 19, 2003, 2240 DCL.
- Fady Najjar, UIUC/CSAR, “Perspectives on Multiphase Flow Simulations,” CSAR Seminar, 12:00 Noon, Wednesday, November 12, 2003, 2240 DCL.
- Yousef Saad, University of Minnesota, “Computational Challenges and Solution Algorithms in Electronic Structure Calculations,” MCC Seminar, 10:00 A.M., Friday, November 7, 2003, 280 MRL.
- William L. Kleb, NASA Langley Research Center, “Agile Team Software Development for Aerodynamic Analysis and Design,” CSAR Seminar, 12:00 Noon, Thursday, October 30, 2003, 2240 DCL.
- Meelan Choudhari, NASA Langley Research Center, “Identification and Control of Airframe Noise Sources,” CSAR Seminar, 12:00 Noon, Wednesday, October 1, 2003, 2240 DCL.