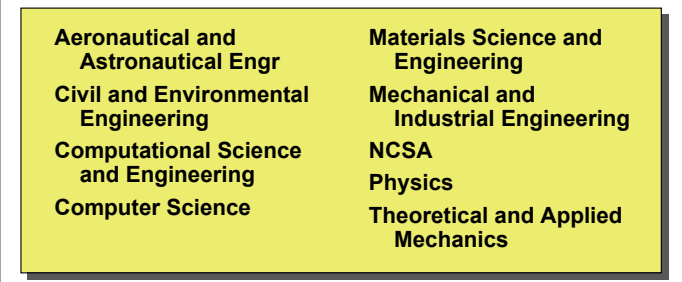


## 5 Education and University Integration

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 six 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 ASCI platforms.



<b>Aeronautical and Astronautical Engr</b>	<b>Materials Science and Engineering</b>
<b>Civil and Environmental Engineering</b>	<b>Mechanical and Industrial Engineering</b>
<b>Computational Science and Engineering</b>	<b>NCSA</b>
<b>Computer Science</b>	<b>Physics</b>
	<b>Theoretical and Applied Mechanics</b>

Fig. 5.1.1: Nine UIUC units participate in CSAR.

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.

**Table 5.1**  
**2002-03 CSAR Seminars**

- Jeff Erickson, UIUC/CS, "Open Questions about Voronoi Diagrams and Delaunay Triangulations," Applied Mathematics Seminar, 3:00 P.M., Monday, September 29, 2003, 100H Talbot Lab.
- Jonathan Shewchuk, UC-Berkeley, "Untangling Dynamically Changing Meshes," Computational Geometry Seminar, 10:00 A.M., Friday, September 26, 2003, 2501 DCL.
- Phil Roth, University of Wisconsin-Madison, "Tool Scalability: A Path to Tools on 1000s of Nodes," CS Seminar, 10:00 A.M., Thursday, September 25, 2003, 2240 DCL.
- Jonathan Shewchuk, UC-Berkeley, "What is a Good Linear Finite Element? Interpolation, Conditioning, Anisotropy, and Quality Measures," CSAR Seminar, 12:00 Noon, Wednesday, September 24, 2003, 2240 DCL.
- Jonathan Shewchuk, UC-Berkeley, "Anisotropic Voronoi Diagrams and Guaranteed-Quality Anisotropic Mesh Generation," Applied Mathematics Seminar, 3:00 P.M., Monday, September 22, 2003, 100H Talbot Lab.
- Cheng Liu, Los Alamos National Laboratory, "Mechanical Behavior and Modeling of Heterogeneous High Explosives," CSAR Seminar, 12:00 Noon, Wednesday, September 17, 2003, 2240 DCL.
- John Dolbow, Duke University, "Extended Finite Element Approximations for Fracture Mechanics and Phase Transformations," CSE Seminar, 12:00 Noon, Thursday, September 11, 2003, 2240 DCL.
- Damrong Guoy, UIUC/CSAR, "Domain Decomposition for Quadrilateral Meshing with Macro Delaunay Refinement," CSAR Seminar, 12:00 Noon, Wednesday, September 10, 2003, 2240 DCL.
- Michele Benzi, Emory University, "Some Techniques for Preconditioning Symmetric Indefinite Linear Systems," CSE Seminar, 3:00 P.M., Friday, September 5, 2003, 2240 DCL.
- Gene Golub, Stanford University, "Techniques for Solving General Saddle Point Systems," CSE Seminar, 2:00 P.M., Thursday, September 4, 2003, 2240 DCL.
- Daniel Szyld, Temple University, "Convergence of Inexact Krylov Methods," CSE Seminar, 12:00 Noon, Wednesday, September 3, 2003, 2240 DCL.
- Karel Matous, RPI, "Multi-Scale Modeling of Inelastic Heterogeneous Solids," CSAR Seminar, 12:00 Noon, Friday, May 30, 2003, 2240 DCL.
- Ali Pinar, Lawrence Berkeley National Laboratory, "The Nice Basis Problem," CSE Seminar, 2:00 P.M., Friday, May 23, 2003, 2240 DCL.
- Al Geist, Oak Ridge National Laboratory, "Designing the Next Generation of Fault Tolerance," CS Seminar, 2:00 P.M., Thursday, May 22, 2003, 2240 DCL.
- Wulue Zhao, Ohio State University, "Shape Reconstruction, Medial Axis Approximation and Mesh Generation," CSAR Seminar, 10:00 A.M., Thursday, May 22, 2003, 2240 DCL.
- Vivek Sarin, Texas A&M University, "Efficient Algorithms for Inductance and Capacitance Extraction," CSE Seminar, 11:00 A.M., Monday, May 19, 2003, 2240 DCL.
- Lihua Zhu, UIUC/MIE, "An Assessment of In-Service Stress Relaxation of a Work-Hardened Al-Mg Alloy," CSAR Seminar, 1:00 P.M., Friday, May 16, 2003, 2240 DCL.
- Amit Acharya, Carnegie Mellon University, "Field Dislocation Mechanics," CSAR Noon Seminar, 12:00, Wednesday, March 19, 2003, 2240 DCL.

- George Karniadakis, Brown University, "The Dawning of the Age of Stochastic Simulations," CSE Symposium, 3:00 P.M., Friday, April 25, 2003, 1005 BI.
- Somnath Ghosh, Ohio State University, "Multi-Level Computational Models For Multiple Scale Analysis of Composite Materials," CSE Symposium, 9:00 A.M., Friday, April 25, 2003, 1005 BI.
- Armando Duarte, University of Sao Paulo, "An Overview of Partition of Unity and Generalized Finite Element Methods," CSAR Noon Seminar, 12:00, Monday, March 17, 2003, 2240 DCL.
- Stephen Bond, University of California at San Diego, "Challenges in Biomolecular Simulation," CS Colloquium, 10:00, Thursday, March 13, 2003, 2240 DCL.
- Tom Jackson, UIUC/CSAR, "Numerical Simulation of Heterogeneous Propellant Combustion," TAM Seminar, 10:30, Thursday, March 6, 2003, 100H Talbot Lab.
- Steve Son, Los Alamos National Laboratory, "Performance and Characterization of Advanced Energetic Materials," TAM Seminar, 10:30 A.M., Thursday, February 20, 2003, 100H Talbot Lab.
- Ewing Lusk, Argonne National Laboratory, "Parallel Programming with MPI in 2003," CS/CSE Seminar, 2:00 P.M., Monday, February 17, 2003, 2240 DCL.
- Michael Heath and Mark Brandyberry, UIUC/CSAR, "Surrounded by Science" -- video presentation of television interview, CSAR Noon Seminar, 12:00, Wednesday, January 29, 2003, 2240 DCL.
- Honglai Tan, Louisiana State University, "A Material Point - Finite Element Formulation for Parallel Simulation of Explosives," CSAR Noon Seminar, 12:00, Tuesday, January 28, 2003, 2240 DCL.
- Phil Boyland, University of Florida, "Lagrangian Mechanics and the Numerical Computation of Periodic Orbits," Applied Math Seminar, 2:00 P.M., Monday, January 27, 2003, 100h Talbot Lab.
- Siu-Wing Cheng, Hong Kong University of Science and Technology, "Graded Conforming Delaunay Tetrahedralization with Bounded Radius-Edge Ratio," CSAR Noon Seminar, 12:00, Wednesday, January 22, 2003, 2240 DCL.
- Bing Jiang, Rutgers University, "The Effect of Grain Size on Yield Stress: From Coarse-Grain to Nano-Grain Regime," CSAR Noon Seminar, 12:00, Wednesday, December 11, 2002, 2240 DCL.
- Kyle Squires, Arizona State University, "Application of DNS and LES to Dispersed Two-Phase Turbulent Flows," CSAR Noon Seminar, 12:00, Tuesday, December 10, 2002, 100H Talbot Lab.
- Kyle Squires, Arizona State University, "Simulation and Modeling of Separated Flows Around Complex Geometries Using Detached Eddy Simulation," AAE Seminar, 4:00 P.M., Monday, December 9, 2002, 103 Talbot Lab.
- Wu-chun Feng, Los Alamos National Laboratory, "Green Destiny: A 240-Node Compute Cluster in One Cubic Meter," 4:00 P.M., Thursday, October 3, 2002, 5602 BI.
- Linda Petzold, University of California - Santa Barbara, "Adaptive Numerical Methods for Sensitivity Analysis of Differential-Algebraic Equations and Partial Differential Equations," CSE/CSAR/ChemE Seminar, 12:00 Noon, Wednesday, October 2, 2002, 2240 DCL.
- Ted Belytschko, Northwestern University, "Arbitrary Discontinuities and Level Sets in Finite Element Methods," 4:00 P.M., Tuesday, October 1, 2002, 218 MEB.