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.

<table>
<thead>
<tr>
<th>Aerospace Engineering</th>
<th>Materials Science &amp; Engineering</th>
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<tr>
<td>Civil &amp; Environmental Engineering</td>
<td>Mechanical &amp; Industrial Engineering</td>
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<td>Computational Science &amp; Engineering</td>
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<td>Computer Science</td>
<td>Physics</td>
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<td>Electrical &amp; Computer Engineering</td>
<td>Theoretical &amp; Applied Mechanics</td>
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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.


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.


Jing Wang, University of Minnesota, “Viscous Potential Flow with Pressure Correction,” CSAR Seminar, 12:00 Noon, Wednesday, August 25, 2004, 2240 DCL.


Mark Shephard, RPI, “Mesh Modification for General Adaptive Mesh Control,” CSE/CSAR Seminar, 10:00 A.M, Tuesday, July 27, 2004, 2240 DCL.


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.


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.


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.


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.


Damrong Guoy, UIUC/CSAR, “Meshing Activities in CSAR,” CSAR Seminar, 12:00 Noon, Wednesday, March 31, 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.


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.


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.


Meelan Choudhari, NASA Langley Research Center, “Identification and Control of Airframe Noise Sources,” CSAR Seminar, 12:00 Noon, Wednesday, October 1, 2003, 2240 DCL.