

5. Education and University Integration

The Center has had a major impact on the university 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 25 new professional staff and postdoctoral associates, 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 (Table 5.1).

The Center spans twelve departments, 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 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 ASCII platforms.

Aeronautical and Astronautical Engr	Materials Science and Engineering
Astronomy	Mechanical and Industrial Engineering
Chemistry	NCSA
Civil and Environmental Engineering	Nuclear Engineering
Computational Science and Engineering	Physics
Computer Science	Theoretical and Applied Mechanics

Fig. 5.1. CSAR spans twelve academic and research units.

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. By virtue of this experience, the students we train are already attuned to the needs of interdisciplinary collaboration. The level of involvement by undergraduates has been limited, but we are beginning to involve undergraduates, especially in laboratory environments.

The Center has generally 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 houses the Center administratively. The computationally-oriented, interdisciplinary educational program provided by CSE fits perfectly with the needs of the Center, 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

1998-99 CSAR Seminars

Rich Lehoucq, Sandia National Laboratories, "Solving Large Scale Eigenvalue Problems with Implicitly Restarted Arnoldi Methods," CSAR Seminar, 4:00 P.M., Thursday, September 16, 1999, 2240 DCL.

Huajian Gao, Stanford University, "Cohesive Elasticity Models of Fracture," MIE Seminar, 4:00 P.M., Tuesday, September 14, 1999, 218 MEB.

Jay Hoeflinger, UIUC/CSAR, "A Performance Comparison of Fortran 90 with MPI and OpenMP on the Origin 2000," NCSA Seminar, 1:30 PM, Tuesday, September 7, 4169 BI.

Luigi Martinelli, Princeton University, "Viscous Flow Solvers for Aerodynamic Analysis and Design," MIE Seminar, 4:00 P.M., Tuesday, August 31, 1999, 218 MEB.

I. Lee Davis, Thiokol Corporation, "Simulating Solid Rocket Motors: Problems to Match My Machines," 12:00, Wednesday, August 25, 1999, 2240 DCL.

Video Presentation, "Challenger: Disaster and Investigation," CSAR Noon Seminar, 12:00, Wednesday, August 18, 1999, 2240 DCL.

Vipin Kumar, University of Minnesota, "Graph Partitioning for Dynamic, Adaptive and Multi-phase Computations," CPSD/CSAR Seminar, 11:00 A.M., Monday, August 9, 1999, 2240 DCL.

Video Presentation, "Opening New Frontiers/We Deliver," CSAR Noon Seminar, 12:00, Wednesday, August 4, 1999, 2240 DCL.

Gerd Lanfermann, Max Planck Institute, Germany, "Brief Overview and Tutorial on Cactus 4.0 - A Modular and Portable Programming Environment for Numerical High Performance Computing," NCSA Seminar, 10:30 A.M., Wednesday, August 4, 1999, 5239 BI.

Achi Brandt, Weizmann Institute, "Multiscale Molecular Dynamics," 3:00 P.M., Wednesday, July 21, 1999, 2269 BI.

Video Presentation, "The Eagle Has Landed/Houston We've Got a Problem," CSAR Noon Seminar, 12:00, Wednesday, July 21, 1999, 2240 DCL.

Achi Brandt, Weizmann Institute, "Review of Multiscale Scientific Computation Methods," 3:00 P.M., Tuesday, July 20, 1999, 2269 BI.

Achi Brandt, Weizmann Institute, "Review of Multiscale Engineering Computation Methods," 4:00 P.M., Monday, July 19, 1999, 1310 DCL.

Video Presentation, "Four Days of Gemini/This Is Houston Flight," CSAR Noon Seminar, 12:00, Wednesday, July 7, 1999, 2240 DCL.

Andreas Stathopoulos, "A Parallel Block Jacobi-Davidson Implementation for Solving Large Eigenproblems on Coarse Grain Environments," CSAR Seminar, 3:00 P.M., Tuesday, July 6, 1999, 2240 DCL.

Video Presentation, "Freedom 7/Voyage of Friendship 7," CSAR Noon Seminar, 12:00, Wednesday, June 23, 1999, 2240 DCL.

Video Presentation, "Space Shuttle," CSAR Noon Seminar, 12:00, Wednesday, June 9, 1999, 2240 DCL.

Tim Baker, Princeton University, "Adaptive Modification of Unstructured Meshes," CSAR/CPSD Seminar, 11:00 A.M., Thursday, May 27, 1999, 2240 DCL.

Yan Solihan, UIUC/CS, "Scal-Tool: Pinpointing and Quantifying Scalability Bottlenecks in Single System Image Shared-Memory Multiprocessors," NCSA Seminar, 11:00, A.M., Thursday, May 20, 1999, 4031 BI.

Dirk Meinkoehn, German Aerospace Center, "Modeling Metal Combustion in Reactive Atmospheres," CSAR Noon Seminar, 12:00, Wednesday, May 12, 1999, 2240 DCL.

Wolfgang Knauss, Caltech, "The Influence of Dilatation in Nonlinear Viscoelasticity and Consequences for Particulate Composites," AAE/CSAR Seminar, Monday, April 26, 1999.

Mary F. Wheeler, UT-Austin, "Synthetic Environments for Modeling Subsurface Flows," CSE Research Symposium, 2:00 P.M., Friday, April 23, 1999, B02 CSRL.

Marsha Berger, NYU/Courant Institute, "Automatic High Performance Fluid Computations in Complex Geometry," CSE Research Symposium, 9:00 A.M., Friday, April 23, 1999, B02 CSRL.

Eric de Sturler, UIUC/CSAR, "Krylov Subspace Methods and the Influence of the Projection Space," CS Colloquium, 4:00 P.M., Wednesday, April 21, 1999, 2240 DCL.

Prasad Alavilli, UIUC/CSAR, "Development of ROCFLO - A Code for Simulation of Solid-Rocket Core and Exterior Flow Dynamics," CSAR Noon Seminar, 12:00, Wednesday, April 21, 1999, 2240 DCL.

John Lee, McGill University, "Recent Results on the Direct Initiation of Detonation Waves," TAM Seminar, 4:00 P.M., Thursday, April 15, 1999, 103 Talbot Lab.

Armand Beaudoin, UIUC/MIE, "Prediction of the Plastic Deformation of Metals Using Polycrystal Plasticity Theory," CSAR Noon Seminar, 12:00, Wednesday, April 14, 1999, 2240 DCL.

Herman Krier, UIUC/MIE, "Transient Burning of Solid Propellants," Nuclear Engineering Seminar, 4:00 P.M., Tuesday, April 13, 1999, 103 Transportation Bldg.

Russell Skocypec, Sandia National Laboratories, "A Concept Called Surety," MIE Seminar, 11:00 A.M., Thursday, April 8, 1999, 253 MEB.

Philippe Geubelle, UIUC/AAE, "Numerical Simulation of Dynamic Fracture Events," CSAR Noon Seminar, 12:00, Wednesday, April 7, 1999, 2240 DCL.

Rod Burton, UIUC/AAE, "When Will We Have Warp Drive?," CSAR Noon Seminar, 12:00, Wednesday, March 31, 1999, 2240 DCL.

James Taft, Sierra Software, NASA Ames Research Center, "Lessons Learned on Large CPU Count Origin Systems," NCSA Workshop, 9:00 A.M.-12:00 noon, Monday, March 29, 1999, 5602 BI.

Paul Feautrier, University of Versailles, France, "Compiling for Massively Parallel Architectures: A Perspective," CSAR Noon Seminar, 12:00, Wednesday, March 24, 1999, 2240 DCL.

Eliot Fried, UIUC/TAM, "Supplemental Relations at a Phase Interface Across Which the Velocity and Temperature Jump," CSAR Noon Seminar, 12:00, Wednesday, March 10, 1999, 2240 DCL.

Jack Dongarra, University of Tennessee, "High-Performance Computing, Numerical Libraries, and Trends," NCSA Seminar, 1:30 P.M., Thursday, February 25, 1999, 3269 BI.

Lee Taylor, Sandia National Laboratories, "An Overview of the SIERRA Project," CSAR Noon Seminar, 12:00, Wednesday, February 24, 1999, 2240 DCL.

Michael Heath, UIUC/CS, "Rocket Science Meets Computer Science: Integrated Simulation of Solid Propellant Rockets," CS Colloquium, 4:00 P.M., Monday, February 22, 1999, 1320 DCL.

Keshav Pingali, Cornell University, "Data-Centric Compilation: A New Approach to Program Restructuring," CS Colloquium, 4:00 P.M., Monday, February 15, 1999, 1320 DCL.

Bill Henshaw and Dan Quinlan, Lawrence Livermore National Laboratory, "Overture: A Framework for Solving Partial Differential Equations on Complex Geometries," CSAR Noon Seminar, 12:00, Wednesday, February 10, 1999, 2240 DCL.

Robert Fiedler, UIUC/CSAR, "GEN1 Rocket Simulation Update," CSAR Noon Seminar, 12:00, Wednesday, February 3, 1999, 2240 DCL.

Min-Gyoo Lee, UIUC/CSAR, "On Combustion Instability with Dynamic Response of Homo/Heterogeneous Solid Propellants," CSAR Noon Seminar, 12:00, Wednesday, January 27, 1999, 2240 DCL.

UIUC High Performance Computing Day, January 15, 1999, 1310 DCL. Speakers include Larry Smarr, Mark Astley, Robert Brunner, Yong Cho, Michael Heath, Jay Hoeflinger, Eric de Sturler, Josep Torrellas, Jeff Vetter, and Eugene Foss.

Philippe Geubelle, UIUC/AAE, "Numerical Simulation of Dynamic Fracture Events," AAE Seminar, 4:00 P.M., Monday, December 7, 1998, 103 Talbot Lab.

Mark Seager and Jean Shuler, Lawrence Livermore National Laboratory, "An Update on ASCI Blue-Pacific: A Primer for CSAR Users," CSAR Seminar, 10:00 A.M., Friday, December 4, 1998, B02 CSRL.

Charbel Farhat, University of Colorado at Boulder, "Recent Advances in High Performance Computational Nonlinear Aeroelasticity," TAM/CSAR Seminar, 4:00 P.M., Thursday, December 3, 1998, 103 Talbot Lab.

Martin Heinstein, Sandia National Laboratories, "Contact-Impact Modeling in Explicit Transient Dynamics," CSAR Noon Seminar, 12:00, Wednesday, December 2, 1998, 2240 DCL.

Paul Dawson, Cornell University, "Residual Stresses in Metal Polycrystals: Comparisons of Experiments and Simulations," CSE/TAM Seminar, 4:00 P.M., Thursday, November 19, 1998, 103 Talbot Lab.

Stef Salvini, NAG Ltd., "Numerical Algorithms Group and High Performance Computing," NCSA Seminar, 11:00 A.M., Thursday, November 19, 1998, 4169 BI.

John Buckmaster, UIUC/AAE, "Flows in Solid-Propellant Rocket Chambers," CSAR Noon Seminar, 12:00, Wednesday, November 18, 1998, 2240 DCL.

Arif Masud, UIC, "A Stabilized Space-Time Formulation of the Navier-Stokes Equations for Moving Boundary Flows," CSE/AAE Seminar, 4:00 P.M., Monday, November 16, 1998, 103 Talbot Lab.

Alvaro Coutinho, Federal University of Rio de Janeiro, Brazil, "Edge-Based Iterative Strategies for the Solution of Finite Element Systems of Equations," CSAR Seminar, 11:00 A.M., Monday, November 16, 1998, 2240 DCL.

Richard Martin, UIUC/Physics, "Simulations of Materials from the Fundamental Equations for the Electrons," CSAR Noon Seminar, 12:00, Wednesday, November 11, 1998, 2240 DCL.

S. Balachandar, UIUC/TAM, "Optimal Formulations for Reduced-Dimensional Simulations of Complex Flows" TAM Seminar, 10:30 A.M., Thursday, November 5, 1998, 100H Talbot Lab.

Wing Kam Liu, Northwestern University, "Multiple Scale Meshfree Methods for Computational Mechanics," Beckman Institute Seminar, 12:00, Wednesday, November 4, 1998, 3269 BI.

Gary Miller, Carnegie-Mellon University, "Using Sphere-Packing for Mesh Generation, Refinement, and Coarsening, and Mesh Partitioning," CS Distinguished Lecture, 4:00 P.M., Monday, November 2, 1998, 1320 DCL.

James Quirk, Caltech, "AMRITA -- Adaptive Mesh Refinement Interactive Teaching Aid," CSAR Seminar, 1:00 P.M., Friday, October 30, 1998, 2240 DCL.

Farid Abraham, IBM Almaden Research Center, "Concurrent Spanning of the Continuum to Quantum Length Scales in Dynamic Simulation: Brittle Fracture of Silicon," CSE/Physics Colloquium, 4:00 P.M., Thursday, October 29, 141 Loomis Lab.

Alla Sheffer, Hebrew University, "Hexahedral Mesh Generation Using the Embedded Voronoi Graph," CSAR Seminar, 3:00 P.M., Thursday, October 29, 1998, 2240 DCL.

Shiyi Chen, Los Alamos National Laboratory, "Studies of Turbulence Using DNS," TAM Seminar, 10:30 A.M., Thursday, October 29, 1998, 100H Talbot Lab.

Dinshaw Balsara, UIUC/NCSA, "Monotonicity-Preserving, Weighted, Essentially Non-Oscillatory Schemes" CSAR Noon Seminar, 12:00, Wednesday, October 28, 1998, 2240 DCL.

Robert Haber, UIUC/TAM, "Simulation and Optimization of Casting and Extrusion Processes," CSAR Noon Seminar, 12:00, Wednesday, October 14, 1998, 2240 DCL.

Video Presentation, "Trinity and Beyond," CSAR Noon Seminar, 12:00, Wednesday, October 7, 1998, 2240 DCL.

Sanjay Kale, UIUC/CS, "Parallel Molecular Dynamics: A Success Story of Application-Oriented Computer Science Research," CS Colloquium, 4:00 P.M., Monday, October 5, 1998, 1320 DCL.

James Ferry, UIUC/CSAR, "Thermal Convection and Modal Analysis," TAM Seminar, 10:30 A.M., Thursday, October 1, 1998, 100H Talbot Lab.