The Interdisciplinary Center for Applied Mathematics (ICAM) is committed to supporting, promoting and facilitating interdisciplinary research and education in applied and computational mathematics at Virginia Tech. Applied and computational mathematics plays a central role in all of modern science and advanced technology. The symbiotic relationship between mathematics and its areas of application is ever growing as more areas of engineering and science become dependent on new mathematical tools and mathematically trained scientists. Applied mathematics is therefore becoming the enabling science for the revolutionary changes taking place in all scientific, engineering and technological fields. These areas are vital to the new industries that will dominate the twenty-first century. The fundamental mission of ICAM is to enhance and expand the historical links among mathematics, computational science, engineering and the sciences. ICAM is actively engaged in cooperative partnerships with several departments, colleges and other institutes at Virginia Tech and is closely aligned with a broad range of industrial partners.

Achievements for FY 2012

Since its founding in 1987, ICAM researchers have worked on a broad spectrum of technology and science challenges in the design, optimization and control of jet engines, wind tunnels, large space platforms, nano-materials, homeland security, life sciences and energy efficient buildings. ICAM is a partner in the Department of Energy’s HUB on Energy Efficient Buildings. During the past year, ICAM worked with Purdue University and United Technology Research Center to develop low-dimensional mathematical models of the indoor air environment in the Purdue Living Laboratory.

This new facility will be used to demonstrate the effectiveness of advanced control algorithms to produce energy savings through optimal feedback control. The new modeling methodology allows engineers to construct practical control and design models by collecting measurements in existing buildings or, as illustrated in the figure, by data from numerical simulation of new buildings. The goal of this effort is to create new computational science tools to enable the design and control of buildings which consume 50% less energy. Achieving this goal is equivalent to taking all cars and small trucks in the United States off the road. In addition, ICAM is a member of the Sotera Defense Solutions Team that was awarded a National Institutes of Health indefinite delivery, indefinite quantity (IDIQ) contract, May 2012. Tasks in this IDIQ contract include Scientific Imaging, 3D Visualization and Cyber Security.

GOALS AND OBJECTIVES for FY 2013

Continue interdisciplinary research on existing projects as well as seek additional collaborations and research support

Contribute to course and program development for the proposed computational science degree program in the College of Science

Organize the international conference, ICAM: 25 Years of Computational and Applied Mathematics Research

Develop the ICAM five year-strategic plan FY 2013 – FY 2018