August 16, 2010 —

More than 300 scientists and engineers from around the world gathered Aug. 8 to the 11th on the USC campus for the 2010 annual conference of the Engineering Mechanics Institute (EMI), which was co-chaired by two faculty from the Sonny Astani Department of Civil and Environmental Engineering.

"This was a service to the engineering community, but I'm also very proud of USC, the Viterbi School and the Astani Department," said conference co-chair Roger Ghanem, professor of civil engineering. "I wanted people to come here and see what we are doing."

This conference introduced USC to the academic community all over the world," said the other co-chair Amy Rechenmacher, an assistant professor of civil engineering. Ghanem serves on EMI's Board of Governors while Rechenmacher is active in several EMI technical committees. The Viterbi School’s Professional Programs directed by Candace House handled conference logistics.

EMI is part of the American Society of Civil Engineers. Engineering mechanics encompasses the intersection of physics and engineering to create better engineering materials and systems. Amar Chaker, EMI’s director said that while the conference proceedings were highly technical, they spanned an amazing breadth of subjects ranging from materials to physics to applied mathematics to systems to structures to turbulence, often resonating with current critical technological and societal issues.

Six keynote lectures summarized research at the frontier of mechanics, highlighting its significance across such diverse fields as materials science, climate change, predictive science, personalized medicine, crowd modeling and population dynamics. In addition to the keynote lectures, the conference program consisted of over 60 technical sessions.

In the opening keynote address, Professor Franz-Josef Ulm of MIT gave an intriguing perspective on concrete, the single largest synthetic material produced on earth. The production of every ton of cement, the key ingredient of concrete, also creates about a ton of CO2, totaling five to ten percent of worldwide total CO2 production. Ulm pointed out that making concrete slabs, beams, arches, shells and other structures stronger with less concrete, including re-engineering the material down to the nano level, could have a significant impact on global warming.

"Concrete hasn't changed much in 2000 years, and we may now be on the cusp of a major breakthrough," said Chaker.

In another keynote, Peter Kuhn of the Scripps Research Institute explored "quantitative diagnostics for personalized cancer therapy management" and described the concept of "translational team science" used in his lab where the disciplines of physics, biophysics, cell biology, pathology and oncology all contribute to the goal of making cancer a managed disease.

"We had a conference session on materials inspired by nature such as nacre (mother of pearl). It is hard and tough, but not as brittle as ceramics," said Chaker. "We had another group looking at mechanics of pavement. How do we improve its properties so that we don't have to replace it every 20 years?"

Rechenmacher said that a large number of faculty and graduate students from the Viterbi School, mostly from the Astani Department, but also from the Departments of Aerospace and Mechanical Engineering and Computer Science, were involved in the conference.

"This was a wonderful opportunity for them to showcase their research and a chance for the Viterbi School and USC to shine," she said. "And the perfect Southern California weather didn't hurt either," laughed Ghanem. The complete conference program can be accessed from its website at: http://viterbi.usc.edu/emi2010 — Viterbi School of Eng.