Mathematical and Computational Challenges in the Control, Optimization, and Design of Energy-Efficient Buildings

IMA Hot Topics Workshop
June 11-14, 2013

Organizers:
John Burns  (Virginia Polytechnic Institute and State University)
Satish Narayanan  (United Technologies Corporation)
Chai Wah Wu  (IBM T. J. Watson Research Center)

Description:
There is ample evidence showing that achieving reductions in U.S. building energy consumption of up to 80% will have a huge impact on the U.S. economy. Reaching this aggressive building-efficiency goal will not happen without significant advances in areas of computational and mathematical sciences. Applied and computational mathematics are required to enable the development of algorithms and tools to design, optimize, and control energy-efficient buildings. The mathematical and computational challenges that arise are daunting and include model reduction; estimation of random parameters; uncertainty management; and control, optimization, and design of multiscale and random interconnected dynamic systems.

This interdisciplinary workshop will present the state of the art in the mathematical and computational aspects that arise in energy-efficient building design. It will provide participants with the opportunity to share ideas, foster collaboration, and gain a deeper understanding of the problems and challenges of managing and designing energy-efficient buildings and the progress made so far.

The intended audience for the workshop includes mathematicians, scientists, and engineers interested in the latest developments and challenges in the mathematical and computational sciences for design, optimization, and control of energy-efficient buildings. The workshop will feature a combination of both research talks and tutorials presented by practitioners of diverse disciplines from industry, government, and academia.

Speakers:
Andrew G. Alleyne  (University of Illinois at Urbana-Champaign)
Lorenz T. Biegler  (Carnegie Mellon University)
Francesco Borrelli  (University of California, Berkeley)
Eugene M. Cliff  (Virginia Polytechnic Institute and State University)
Bryan Eisenhower  (University of California, Santa Barbara)
Gregor P. Henze  (University of Colorado)
Vanessa Lopez  (IBM)
Manfred Morari  (ETH Zurich)
Zheng O’Neill  (United Technologies Corporation)
Victor M. Zavala  (Argonne National Laboratory)

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