

MAE Praxair Seminar

Near real-time size distribution measurements of airborne nanoparticles

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Abstract:

Airborne nanoparticles, produced as a result of natural and anthropogenic activities, are important from environmental and human health perspective. The behavior of these particles in their immediate environment is strongly dependent on their size. Size distribution measurement of these particles is best achieved using a differential mobility analyzer (DMA). In a DMA, particles are classified based on their response to applied flow and electrical force fields. While DMAs are very accurate, size distribution measurements with these instruments require significant time (~ 5 minutes) and nanoparticle measurements are often compromised by diffusion of these particles in the instrument.

In this talk, I will present theory of DMA operation and recent advances in our group to make near real-time measurements of airborne nanoparticles using fast scanning DMAs. I will present theory of fast scanning and our new approach to represent instrument characteristics or transfer functions. Experimental results validating our theoretical approach will also be presented. I will also discuss the effect of the force field non-uniformities on particle spatial distribution in the DMA for diffusing particles and its effect on measurement resolution.

Bio:

Suresh Dhaniyala is an associate professor in the Department of Mechanical and Aeronautical Engineering at Clarkson University. He joined Clarkson University as an Assistant Professor in 2002 after a Post-Doc in Chemical Engineering at California Institute of Technology. Suresh earned his PhD degree (1998) in Mechanical Engineering from the University of Minnesota and has a M.S. (1994) from the University of Delaware, and B.Tech (1992) from the Indian Institute of Technology, Madras, India. He was the recipient of a NSF CAREER Award in 2006 and the John W. Graham Jr. Faculty Research Award from Clarkson University in 2007. He serves as a director on the board of the American Association of Aerosol Research. His research interests are in the field of aerosol physics, aerosol instrumentation, aircraft-based aerosol sampling, and aerosol-cloud interactions.

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110 Knox Hall