

Boulder Fluid and Thermal Sciences Seminar Series



Tuesday, May 30, 2017
2:30pm-3:30pm (refreshments at 2:15pm)
ECAD Clark Conference Room 150
University of Colorado, Boulder

Acoustic Tomography of the Atmospheric Surface Layer

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Acoustic tomography of the atmospheric surface layer (ASL) is based on travel-time measurements between speakers and microphones in a spatial array, which are arranged so as to create propagation paths through the region to be sampled. Then, the temperature and wind velocity fields inside the tomographic region are reconstructed by inverting the travel times. Tomography has certain advantages over conventional point measurements, such as spatial averaging and a quadratic growth of the observations relative to the number of sensors. An array was built at the Boulder Atmospheric Observatory (BAO) which enabled horizontal-slice tomography of the ASL at a height of 8 m above the ground, in an 80 m x 80 m region. The instrumentation and principle of operation of the BAO tomography array are explained. Inverse algorithms for reconstruction of the temperature and wind velocity fields from the travel times are reviewed. Results in numerical simulations of the BAO tomography array and reconstruction of turbulence fields in tomography experiments are presented. Acoustic tomography of the atmosphere can also be performed at other spatial scales, ranging from a size of an ultrasonic anemometer/thermometer to the height of the atmospheric boundary layer and even in the stratosphere and thermosphere.

Biography: Dr. Vladimir E. Ostashev is a government expert for the U.S. Army Engineer Research and Development Center. He earned a PhD in physics from the Moscow Physics and Technology Institute, Russia in 1979. His undergraduate and graduate advisor was Prof. Valerian Tatarskii. In 1992, Dr. Ostashev earned a degree of Doctor of physical and mathematical sciences from the Acoustics Institute, Moscow, which is similar to Habilitation in Western Europe. Since 1979, Dr. Ostashev worked at the Obukhov Institute of Atmospheric Physics (Moscow, Russia), New Mexico State University (Las Cruces, New Mexico), and until recently, CIRES/CU. Dr. Ostashev has also held visiting positions at the University of Oldenburg (Germany), Ecole Centrale de Lyon (France), and Open University (UK). He is a fellow of the Acoustical Society of America, and an associate editor of the Journal of the Acoustical Society of America and JASA Express Letters.