



**TEXAS TECH UNIVERSITY**

**Presidents' Distinguished Lecture Series  
in Engineering, Science and Medicine**

## **How do Dispersed Inertial Particles Modify Turbulent Flows?**

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### **Abstract**

Turbulent flows laden with inertial particles are ubiquitous in nature (e.g. aerosols in clouds, and dust storms on Earth and Mars) and in industrial applications (e.g. liquid fuel and pulverized coal sprays in combustion chambers). Experimental and numerical studies of these flows are quite challenging due to the wide spectra of length- and time- scales of the dispersed particles in addition to the spectra of scales intrinsic to the carrier fluid turbulence. The two-way and four-way nonlinear interactions between the dispersed particles and the turbulence result in complex multi-scale physical phenomena. The lecture focuses on the physical mechanisms of interactions between dispersed spherical particles and isotropic turbulence using Direct Numerical Simulation (DNS). Particles whose diameter is smaller than the Kolmogorov length scale are simulated as point particles. Larger particles with diameter of the order of Taylor microscale are fully resolved using the Immersed Boundary method.

### **Bio**



Said Elghobashi received his Masters of Science degree at the University of Southern California in 1971, his PhD at Imperial College at the University of London in 1974, and the Doctorate of Science at Imperial College in 1999. He is a member of the National Academy of Engineering, Fellow of the American Physical Society, American Association of the Advancement of Science, and of the American Society of Mechanical Engineers. Dr. Elghobashi is now a Distinguished Professor in the Department of Mechanical and Aerospace Engineering at UC Irvine. The main focus of his research is aimed at understanding some of the fundamental properties of turbulence using the direct numerical simulation (DNS) method, a numerical representation of the exact, three-dimensional, time-dependent Navier-Stokes equations. While the larger, long-term goal of his work is to predict engineering flows in complex geometries (the flow over an airplane or the flow of air inside a combustor, for example), Dr.

Elghobashi currently is looking at chemically-reacting and particle-laden turbulent flows in simple geometries. His work can be used to improve mathematical closure models employed in predicting turbulent flows in practical applications.

**Monday, April 11, 2016**  
**Livermore Center 101 | 2:00 – 3:00 pm**