# UAH Mathematical Sciences

## Dr. Karen A. Ames Memorial Lectures on Applied Mathematics

# Dr. Edriss S. Titi

**Texas A&M University**
**The Weizmann Institute of Science**

## Continuous Data Assimilation for Weather and Climate Models

**DATE:** **February 12, 2016**
**TIME:** **3:00 p.m.**
**LOCATION:** **Shelby Center 105**

One of the main characteristics of infinite-dimensional dissipative evolution equations, such as the Navier-Stokes equations (NSE), is that their long-time dynamics is determined by finitely many parameters - finite number of determining modes, nodes, volume elements and other determining interpolants. In this talk I will show how to explore this finite-dimensionality feature for designing data assimilation algorithms of weather and climate prediction based on discrete measurements. In addition, I will also show that the long-time dynamics of the NSE can be imbedded in an infinite-dimensional dynamical system that is induced by an ordinary differential equations, named *determining form*, which is governed by a globally Lipschitz vector field. The NSE are used as an illustrative example, and all the above mentioned results equally hold to other dissipative evolution PDEs, in particular to various dissipative geophysical and climate models.

**Dr. Edriss S. Titi is the holder of the Owen Professorship of Mathematics in Texas A&M University, a Professor of Computer Science and Applied Mathematics at the Weizmann Institute of Science in Israel, and Professor Emeritus in the University of California, Irvine.**

**Dr. Titi is a Fellow of the Institute of Physics, UK, a Fellow of the Society for Industrial and Applied Mathematics (SIAM), and a Fellow of the Inaugural Class of the American Mathematical Society (AMS). He was the Orson Anderson and the Stanislaw M. Ulam Distinguished Visiting Scholar in the Los Alamos National Laboratory. He received the Humboldt Research Award for Senior U.S. Scientists. He also received the SIAM Prize on Best Paper in Partial Differential Equations. In 2013 he received the Science without Boundaries Scholarship, by the CNPq, Brazil.**

**The research of Dr. Titi in applied and computational mathematics lies at the interface between rigorous applied analysis and physical applications. Most of his work has been focused on the development of analytical and computational techniques for investigating nonlinear phenomena. Specifically, in studying the Euler and the Navier-Stokes equations of incompressible fluids, and other related nonlinear partial differential equations. Such equations arise as models in a wide range of applications in nonlinear science and engineering. The applications include, but are not limited to, fluid mechanics, geophysics, turbulence, chemical reactions, nonlinear fiber optics, and control theory.**

**Refreshments will be served at 2:30 p.m.**