

AES Distinguished Lecture Series

From Stochastic Modeling to Fractional Modeling: New Tools in Large-Scale Simulations

George Em Karniadakis | Charles Pitts Robinson & John Palmer
Barstow Professor of Applied Mathematics, Brown University

Friday, April 4 | 4:00-5:00 p.m. | ECCR 200

In many simulations in fluid and solid mechanics — but even in molecular simulations — there are many sources of uncertainty, anomalous dynamics and memory effects, such as those associated with material properties, boundary conditions, and strong heterogeneity or confinement. These phenomena cannot be captured with the standard tools of computational mechanics. Such effects may contribute to large errors in simulation, often much larger than spatio-temporal errors, leading to erroneous dynamics or performance predictions. Karniadakis will present new stochastic modeling approaches, as well as deterministic fractional models that provide more flexibility and possibly greater rigor in quantifying and predicting such phenomena in large-scale multi-physics simulations.



George Karniadakis received his S.M. (1984) and PhD (1987) from the Massachusetts Institute of Technology. He was appointed Lecturer in the Department of Mechanical Engineering at MIT in 1987 and subsequently joined the Center for Turbulence Research at Stanford/NASA Ames. He joined Princeton University as Assistant Professor in the Department of Mechanical and Aerospace Engineering and as Associate Faculty in the Program of Applied and Computational Mathematics. He was a Visiting Professor at Caltech (1993) in the Aeronautics Department, and joined Brown University as Associate Professor of Applied Mathematics in the Center for Fluid Mechanics on Jan. 1, 1994. He became a full professor on July 1, 1996. He has been a Visiting Professor and Senior Lecturer of Ocean/Mechanical Engineering at MIT since Sept. 1, 2000. He was Visiting Professor at Peking University (Fall 2007). He is a Fellow of the Society for Industrial and Applied Mathematics (SIAM, 2010-), Fellow of the American Physical Society (APS, 2004-), Fellow of the American Society of Mechanical Engineers (ASME, 2003-), and Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA, 2006-). He received the CFD Award (2007) and the J Tinsley Oden Medal (2013) by the US Association in Computational Mechanics. His h-index is 60 and he has been cited more than 17,500 times (see Google Scholar Citations). Karniadakis is the lead PI of an OSD/AFOSR MURI on Uncertainty Quantification and Director of a new DOE Center of Mathematics for Mesoscale Modeling of Materials (CM4).

For more information on this seminar, contact Prof. Alireza Doostan at doostan@colorado.edu



Aerospace Engineering Sciences
UNIVERSITY OF COLORADO BOULDER

Be Boulder.