



**THE WILLIAM E. BOEING DEPARTMENT OF  
AERONAUTICS & ASTRONAUTICS  
CHAIR'S DISTINGUISHED SEMINAR SERIES  
WELCOMES**

**DR. HONG WANG  
CHIEF SCIENTIST AND LABORATORY FELLOW  
PACIFIC NORTHWEST NATIONAL LABORATORY**

***“Stochastic Distribution Control and Its Applications -  
a Probability Density Function Shaping Theory for  
non-Gaussian Stochastic Systems”***

**ABSTRACT**

Stochastic distribution control systems are widely seen in practical processes, where the aim of the controller design is to realize a shape control of the distributions of certain random variables in the process so as to minimize the impact of uncertainties or randomness to the operational performance of the system. Once the probability density functions (PDFs) of these variables are used to describe their distributions, the control task is then transferred into obtaining time-domain feedback control signals so that the output PDFs of the stochastic system are made to follow their target PDFs. In this talk, a summary of the recent developments on the research of stochastic distribution control systems theory will be

made together with the discussions on future research directions. In particular, topics on the modelling, control and optimization of the stochastic distribution control systems will be described, where potentials of using such a theory to solve uncertainty quantification and minimization will be discussed for complex dynamic systems such as those seen in material processing, chemical reactions and transportation. Indeed, our recent research shows that stochastic distribution control theory can provide effective solutions to generic issues on modelling, data mining, signal processing and stochastic optimization for complex non-Gaussian and nonlinear systems.



**WILLIAM E. BOEING  
DEPARTMENT OF AERONAUTICS & ASTRONAUTICS**

**UNIVERSITY of WASHINGTON**

***Monday, May 21, 2018  
4:00 - 5:00 pm  
Guggenheim Hall Rm. 220  
UW Campus, Seattle, WA***

# THE WILLIAM E. BOEING DEPARTMENT OF AERONAUTICS & ASTRONAUTICS

## *Chair's Distinguished Seminar Speaker*



**Dr. Hong Wang**  
Chief Scientist and Laboratory Fellow

**Pacific Northwest  
National Laboratory**

### **Biography**

Dr. Hong Wang received his BSc, MEng and PhD degrees from Huainan University of Mining Engineering (AHUST) and Huazhong University of Science and Technology (HUST) in P R China 1982, 1984 and 1987, respectively. He then worked as a postdoc at Salford, Brunel and Southampton Universities between 1988 and 1992 in the United Kingdom. He joined University of Manchester Institute of Science and Technology (UMIST) in 1992 as a lecturer, and was then promoted to a Senior Lecturer in August 1997, to a Reader in August 1999, and to a full chair professor in April, 2002. He had been the deputy Head of Paper Science Department and the director of the UMIST Control Systems Centre, and was a university senate member during his time in Man-

chester. Hong Wang joined PNNL in February 2016 as a chief scientist and laboratory fellow working in the area of advanced modelling, control and optimization of complex dynamic systems. Dr. Wang is the lead author of five books and has published over 300 papers in international journals and conferences, and has been invited to give keynote/plenary talks at some international conferences and workshops. He originated the research on stochastic distribution control where the main purpose of control input design is to make the shape of the output probability density functions to follow a targeted function. This area alone has found a wide spectrum of potential applications in modeling, data-mining, signal processing, optimization and distributed control systems design.



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