Center for Applied Mathematical Sciences
Distinguished Lecturer, Fall 2013

Ruth J. Williams

Resource Sharing in Stochastic Networks

Abstract: Stochastic models of processing networks arise in a wide variety of applications in science and engineering, e.g., in high-tech manufacturing, transportation, telecommunications, computer systems, customer service systems, and biochemical reaction networks. These "stochastic processing networks" typically have entities, such as jobs, vehicles, packets, customers or molecules, that move along paths or routes, receive processing from various resources, and that are subject to the effects of stochastic variability through such variables as arrival times, processing times and routing protocols.

Networks arising in modern applications are often heterogeneous in that different entities share (i.e., compete for) common network resources. Frequently the processing capacity of resources is limited and there are bottlenecks, resulting in congestion and delay due to entities waiting for processing.

The control and analysis of such networks present challenging mathematical problems.

This talk will explore the effects of resource sharing in stochastic networks and describe associated mathematical analysis based on elegant fluid and diffusion approximations. Illustrative examples will be drawn from biology and telecommunications.

Monday, October 21, 2013

University of Southern California
Kaprielian Hall

Reception: 3:00 p.m.
KAP 410

Lecture: 3:30 p.m.
KAP 414

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Ruth Williams, a professor of mathematics, joined the UC San Diego faculty in 1983 and currently holds the Charles Lee Powell Chair in Mathematics. Her research is focused on probability, stochastic processes and their applications. She is especially well known for her work on theory and applications associated with stochastic networks, which arise in semiconductor manufacturing, telecommunications, computer systems, internet congestion control and systems biology.

Ruth Williams is a Member of the US National Academy of Sciences, a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science and the Institute of Mathematical Statistics. She has been a U.S. National Science Foundation Presidential Young Investigator, an Alfred P. Sloan Fellow, and a Guggenheim Fellow. She is the past President of the Institute of Mathematical Statistics, a major professional society for those doing research in probability and statistics. Ruth Williams received her bachelor's of science and masters of science degrees at the University of Melbourne, Australia and she earned her Ph.D. degree in mathematics from Stanford University.