Industrial & Systems Engineering
Seminar Announcement

Fourier Metamodels for Exploring Dynamic Simulation Output

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Abstract: High-frequency coefficients in the Fourier transform of simulation trajectory data (such as queue length over time) can be used to discriminate dynamic behavior differences between congested and uncongested systems. Continuous time simulation statistic 'trajectories' can be converted to time series for discrete Fourier analysis. The pattern of Fourier component magnitudes across frequencies differs for congested versus uncongested systems. We use this knowledge to explore statistical process control methods to monitor nonstationary systems for transition from uncongested to congested state and vice versa. Further, approximations to average trajectory behavior can be constructed from a subset of the Fourier coefficients, and the coefficient values can be modeled as a function of the simulation model parameters. Thus an average trajectory can be forecase for a simulation model that has not been run.

Bio: *Russell R. Barton* is distinguished professor of supply chain and information systems and professor of industrial engineering at the Pennsylvania State University. He currently serves as senior associate dean for research and faculty in the Smeal College of Business. He received a B.S. degree in electrical engineering from Princeton University and M.S. and Ph.D. degrees in operations research from Cornell University. He serves as the Vice President for Sections and Societies on the INFORMS Board of Directors. He is a Fellow of IIE, a Senior Member of IEEE and a Certified Analytics Professional®. His research interests include applications of statistical and simulation methods to simulation-based system design and product design, manufacturing and delivery. His email address is rbarton@psu.edu.

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