

# INDUSTRIAL & SYSTEMS ENGINEERING SEMINAR

**Wednesday, March 28**

3:15 PM – Refreshments before the seminar

3:30 PM – Graduate Seminar

**Mechanical Engineering Room 4125 A & B**



## **Analysis of a Splitting Estimator for Rare Event Probabilities in Jackson Networks**

Professor Kevin Leder  
Industrial and Systems Engineering  
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We consider a standard splitting algorithm for the rare-event simulation of overflow probabilities in any subset of stations in a Jackson network at level  $n$ , starting at a fixed initial position. It was shown in Dean and Dupuis 2009 that a subsolution to the Isaacs equation guarantees that a subexponential number of function evaluations (in  $n$ ) suffice to estimate such overflow probabilities within a given relative accuracy. Our analysis here shows that in fact a polynomial number of function evaluations suffice to achieve a given relative precision, the order of the polynomial is explicitly identified and showed to depend on the number of bottlenecks in the system. This is the first rigorous analysis that allows the favorable comparison of splitting against directly computing the overflow probability of interest, which can be evaluated by solving a linear system of equations. This is based on joint work with Yixi Shi and Jose Blanchet.

BIO: S. Professor Leder's research interests have centered around the study of rare events in Markov processes, the relationship between stochastic simulation and probability theory, and stochastic process models arising in queueing systems and population biology. He is extremely interested in stochastic process models of cancer evolution, and the use of these models to investigate important biological questions regarding the initiation, progression and treatment of cancer. Previously, he was a postdoc at Dana Farber Cancer Institute and the Department of Industrial Engineering and Operations Research at Columbia, and he received a PhD in 2008 from the Department of Applied Mathematics at Brown.

**FOR MORE INFORMATION ON PROFESSOR LEDER'S RESEARCH,  
PLEASE VISIT: <http://www.menet.umn.edu/~lede0024/index.html>**