Arthur Imperatore School of Sciences and Arts

Department of Mathematical Sciences

Seminar in Stochastic Systems

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Stochastic Network Interdiction of Nuclear Material Smuggling

Tuesday, March 8, 2005
4:00 pm
Morton 203

Abstract: We describe a stochastic network interdiction model for locating sensors that detect nuclear material. In our model a nuclear material smuggler selects a path through a transportation network that maximizes the probability of avoiding detection. An interdictor installs sensors to minimize that maximum probability. We formulate this problem as a bi-level stochastic mixed-integer program. The program is stochastic because the evader s origin and destination are unknown at the time the sensors are installed. We show this model can be reformulated as a two-stage stochastic mixed-integer program with recourse. A special case in which the underlying network is bipartite is further investigated. We show that a class of valid inequalities, called step inequalities, can significantly reduce computational e ort. Our model has application to the US Second Line of Defense program to help strengthen the overall capability of preventing the illicit tracking of nuclear materials. This is joint work with Feng Pan.

David Morton is an Associate Professor in the Graduate Program in Operations Research at The University of Texas at Austin. He graduated from Stetson University with a BS in Mathematics and Physics and from Stanford University with an MS and PhD in Operations Research. Prior to joining UT-Austin, he spent two years at the Naval Postgraduate School as a National Research Council Postdoctoral Fellow. Professor Morton is a member and a former chair of the Stochastic Programming Committee of the Mathematical Programming Society. He is an associate editor of Naval Research Logistics and Operations Research, and recipient of many awards.

Refreshments provided

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