TRANSPORTATION SEMINAR SERIES

Friday, January 25, 2007
4 - 5 p.m. in 240 Bechtel Engineering Center

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Optimizing flight delays and reroutes under uncertainty in weather.

Abstract: In this talk, an optimization model is presented, which can applied to assign pre-departure delays to flights under uncertainty in the capacity of their destination airport. The model is extended to manage air traffic flow inbound at an airport, when both the airport itself and its approach routes are subject to adverse weather. The decision variables in the model are aggregate number of flights planned to arrive at various capacity constrained resources, and the amount of rerouting that is necessary to avoid flying through weather affected airspace. In the model, ground delay decisions are static, while those on rerouting are dynamic. In contrast to static rerouting, the dynamic rerouting capability results in making rerouting decisions that are better matched to realized weather conditions. When adverse weather blocks or severely limits capacity of terminal approach routes, rerouting flights onto other approaches yields substantial benefits by alleviating high ground delays. Experimental results indicate that making rerouting decisions dynamically results in 10-15% delay cost reduction compared to static rerouting, and about 50% less delay cost compared to a “pure” ground holding strategy (i.e., no rerouting).

Bio: Dr. Mukherjee is a research scientist at UARC, NASA Ames. He is involved in the air traffic management research at NASA, supporting the development of decision making models and tools to manage air traffic flow under uncertainty in airspace capacity and demand. Dr. Mukherjee earned his Ph.D. in Civil and Environmental Engineering from U.C. Berkeley in 2004. His Ph.D. dissertation was supervised by Prof. Mark Hansen. After graduating, he joined the Institute for Systems Research, University of Maryland at College Park, as a post-doctoral researcher, and was involved in the aviation research at NEXTOR under supervision of Prof. Mike Ball.

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