

chastic influences on the dynamic of the production flow.

- 2 – Optimal Control of Supply Chains with Variable Product Mixes**  
Matthias Kawski, Arizona State University, Department of Mathematics, Tempe, AZ, United States, kawski@asu.edu, Eric Gehrig

We consider supply chains with load-dependent delays, product mixes that share finite capacities and stochastic yields. We determine the best mix of inputs so that the output mix will closely match market demands while maintaining desirable minimal inventory levels. Higher grade product may be sold at a lower price to satisfy demand for lower grade product. We use optimal control theory and present both theoretical results and simulations for optimal inventory and reorder policies.

- 3 – Validation of PDE Models for Supply Chain Modeling and Control**

Erjen Lefeber, Eindhoven University of Technology, Systems Engineering, Eindhoven, Netherlands, A.A.J.Lefeber@tue.nl

An important class of supply chain and/or manufacturing control problems asks for proper balancing of both throughput and cycle time for a large nonlinear dynamical system that never is in steady state. Recently, PDE models emerged as a new modeling and control paradigm. The validity of these models will be addressed, e.g. when describing ramp up of a manufacturing system.

- 4 – Dynamically Updated Throughput Times for Discrete Event Simulation and Relations to Fluid Limits**

Christina Ringhofer, Arizona State Univ., Dept. of Mathematics, Tempe, AZ, United States. ringhoft@mzart.la.asu.edu, Dieter Armbruster

We present a new approach to computing throughput times for discrete event simulation based on a “random clock” approach. In this approach the estimated time of completion of all the lots in the system is continuously updated, taking into account dynamic changes of the WIP. The continuous product - long time average limit of these models results in a diffusion equation for the product flow.

## ■ MA42

### Applications of Dynamic Pricing in Telecom, Retail, Commodity Markets and Supply Chain Networks

Sponsor: Revenue Management & Dynamic Pricing  
Sponsored Session

Chair: Soulaymane Kachani, Assistant Professor, Columbia University, Dept. IEOR, New York, NY, United States, sk2267@columbia.edu

- 1 – Static Pricing for a Network Service Provider**

David Simchi-Levi, Professor, MIT, 77 Massachusetts Ave, Bldg 1-171, Cambridge, MA, United States, dslevi@mit.edu, Felipe Caro

We consider the case of a network service provider with a given bandwidth and facing different types of customer classes. For each class the service provider has a limit on the maximum number of customers that can be served as well as a limit on the total number of customers across all types. The provider's objective is to determine a static price (per unit of time) for each class so as to maximize expected profit.

- 2 – Dynamic Pricing in a Multi-Product Retail Market**

Soulaymane Kachani, Assistant Professor, Columbia University, Dept. IEOR, New York, NY, United States, sk2267@columbia.edu, Georgia Perakis

In this talk we present a model of dynamic pricing for multiple products in a capacitated supply chain market. We take a fluid dynamics approach and incorporate the element of competition. A key characteristic of this model is that it directly accounts for the delay of price and level of inventory in affecting sales.

- 3 – Commodity Spot Pricing with Discount Offer in a Weak Fencing Environment**

Vijoj Buraparate, Senior Scientist, Manager, PROS Revenue Management, 3100 Main Street, Suite 900, Houston, TX, 77002, United States, vburaparate@prosr.com, Navin Aswal

A method to generate multiple price points for a commodity product is presented. We include the effects of the fencing environment on the price selection process. Example from downstream petroleum industry is used to illustrate the implementation details.

- 4 – Fluid Models for Dynamic Pricing and Inventory Management**

Georgia Perakis, Sloan Career Development Associate Professor, Sloan School MIT, 50 Memorial Drive, Sloan School, E53-359, Cambridge, MA, 02139, United States, georgiap@mit.edu, Elodie Adida

In this talk we present nonlinear fluid models for dynamic pricing and inventory management in make-to-stock systems. We consider a multi-class, capacitated, dynamic setting. We discuss a variety of demand based models that differ through their cost structure. We propose production and pricing policies and discuss some insights.

## ■ MA43

### Online Auction Strategies

Cluster: Auctions

Invited Session

Chair: Jayant Kalagnanam

RSM, IBM Watson Research, PO Box 218, Yorktown Hts, NY, 10598, United States, jayant@us.ibm.com

- 1 – Strategic Bidding in Multi-unit Online Auctions: Insights and Analysis**

Paulo Goes, Professor, Business School, University of Connecticut, Storrs, CT, 06269, United States, Paulo.Goes@business.uconn.edu, Ravi Bapna, Alok Gupta

We analyze several non-trivial bidding strategies in the context of multi-unit online auctions using an agent-based simulation model. These include jump bidding, strategic-at-margin bidding, and the buy-it-now option. The simulation tool exploits the extensive multi-unit auction bidding behavior data that is captured online, to structurally replicate the original tracked auctions.

- 2 – Effect of Information Revelation Policies on Cost Structure Uncertainty**

Karthik Kannan, Assistant Professor of MIS, Purdue University, 403 West State Street, West Lafayette, IN, 47907, United States, kkarthik@cmu.edu, Ramayya Krishnan

Geographically dispersed sellers in electronic reverse-marketplaces such as Freemarkets are uncertain about their opponents' cost-structure. Over the course of several market-sessions, they learn about the nature of their market. Their ability to learn is dictated by the revelation-policy adopted. In this paper, we use game-theory to compare revelation-policies using a consumer-surplus metric.

- 3 – Efficient Online Mechanisms**

David Parkes, Asst. Prof., Harvard University, 33 Oxford Street, Cambridge, MA, 02138, United States, parkes@eecs.harvard.edu

We consider the efficient online mechanism design problem in which agents arrive dynamically, bringing temporal considerations into an agent's strategy space. Truthful and immediate revelation is a Bayesian-Nash equilibrium in an online VCG-based mechanism, that makes dynamic resource-allocation decisions. We formulate the winner-determination and payment problem as a Markov Decision Process, and present theoretical and experimental results.

- 4 – Polyhedral Methods for Multiattribute Preference Elicitation**

Jayant Kalagnanam, RSM, IBM Watson Research, PO Box 218, Yorktown Hts, NY, 10598, United States, jayant@us.ibm.com, Souymadip Ghosh

Sequential pairwise bid comparisons are common in multiattribute auction settings for bid ranking. We introduce efficient polyhedral techniques to identify the next comparison to optimize information revelation. Two central computations: (i) centroid computation, and (ii) bisecting hyperplane are handled efficiently in high dimensions by sampling on a polytope.

## ■ MA44

### The FAA Strategy Simulator, Part 1

Sponsor: Aviation Applications

Sponsored Session

Chair: Michael Ball, Professor, University of Maryland, R H Smith School of Business, Van Munching Hall, College Park, MD, 20742, United States, MBall@rhsmith.umd.edu

Co-Chair: Norm Fujisaki, Dep Dir, System Architecture & Investment Analysis, FAA, 800 Independence Ave, SW, Washington, DC, 20591, United States, norman.fujisaki@faa.gov

- 1 – FAA NAS Strategy Simulator**

David Peterson, Ventana Systems, Inc., 60 Jacob Gates Road, Harvard, MA, 01451, United States, davidpeterson@vensim.com, Dan Goldner, Norm Fujisaki, Ron Suiter

Overview of a top-down strategy simulator for the National Airspace System (NAS), including passengers, airlines, aircraft, airports, and air traffic control. Key inputs are policy options and infrastructure investments. Outputs are performances and costs and organizational impacts system-wide. The structure of the model will be presented, with discussion of three sources of data for calibration and validation: historical data, expert thought experiments, and offline detailed simulations.

- 2 – The Economic Impact of Aviation in the FAA Strategy Simulator Model**

Virginia Stouffer, Research Fellow, LMI, 2000 Corporate Ridge, McLean, VA, 22102, United States, VSTOUFFER@lmi.org, Earl Wingrove, Jing Hees

We discuss the impact of aviation on the national economy modeled in the FAA Strategy Simulator. The model uses well-quantified inputs such as enplanements or aviation revenues and estimates impacts on GDP. We base our estimates on