2007 ACC Workshop Proposal:

An Introduction to Financial Engineering for Control Theorists

Organizers:
James Primbs, Stanford University
Muruhan Rathinam, UMBC
Yuji Yamada, University of Tsukuba

The purpose of this workshop is to introduce control theorists to the exciting research and application area of financial engineering, and to present a number of active research areas where a control theory perspective is making an impact. The morning session will cover the basics of finance theory including financial market fundamentals, the Black-Scholes option pricing theory, dynamic hedging, portfolio optimization, and risk management. The second part of the workshop will cover cutting edge research in financial engineering, with an emphasis on the role that control theory is playing. The workshop will be taught by control theorists who are now actively working in the financial engineering area. No prior knowledge of finance is assumed, so the workshop is suitable for those who are interested in learning the fundamentals of finance and gaining a sense of where control theory is making a contribution. It should also be of interest to researchers seeking potential applications in finance.

Workshop Schedule:

Morning Sessions
8am: Financial Market Basics
9am: Financial Math Basics
9:45-10am: Coffee Break
10am-12pm: Modern Asset Pricing and Portfolio Optimization Theory
12pm: Lunch
Afternoon Sessions
1 – 2:45pm: Option Pricing Theory
2:45 – 3pm: Coffee Break
3pm: Semi-definite programming for option pricing
3:30pm: Modeling of Trader Behavior
4pm: Valuation and Hedging of Derivatives on Non-Traded Assets
4:30pm: Stochastic Receding Horizon Control for Portfolio Optimization

About the Organizers

James Primbs is an assistant professor in the Management Science and Engineering department at Stanford University. He holds undergraduate degrees in Mathematics and Electrical Engineering from UC Davis, a Masters degree in Electrical Engineering from Stanford, and a PhD in Control and Dynamical System from Caltech. At Stanford, he teaches courses in Investment Science and Financial Engineering. His current research interests include stochastic receding horizon control

for financial engineering problems, modeling of trader behavior, and semi-definite programming approaches to option pricing.

Yuji Yamada is an associate professor in the Graduate School of Business Sciences, University of Tsukuba, Japan. He holds an undergraduate degree in Engineering from University of Chiba, a Masters degree and PhD in Engineering from Tokyo Institute of Technology. Before joining University of Tsukuba, he served as a postdoctoral scholar at Control and Dynamical Systems, Caltech. At University of Tsukuba, he teaches courses in Mathematical Finance and Financial Engineering. His current research interests VaR estimation for dynamic hedging, multinomial lattices with cumulants for option pricing and hedging, and pricing of derivatives on non-traded assets.

Muruhan Rathinam is an assistant professor in the Mathematics and Statistics department at University of Maryland Baltimore County (UMBC). He holds a PhD in Applied Mathematics from Caltech and he has held postdoctoral positions both at Caltech and University of California Santa Barbara. His current research interests include modeling and efficient numerical simulation methods for stochastic dynamics with
applications in chemical kinetics as well as financial markets.