

The School of Natural Sciences

Presents

An introduction to Control Methods for Financial Portfolios

Seminar Series – Physics & Applied Mathematics.

James A. Primbs

Assist Professor of Management Science & Engineering
Stanford University

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ABSTRACT

Many problems involving the management of a financial portfolio fall quite naturally into a control theory framework. In the control paradigm, asset price models combined with an investor's wealth make up the system dynamics, and the shares held of each asset are the control variables. The objective function is then determined by the purpose of the portfolio. In this talk, we begin by introducing the fundamental problems of portfolio optimization and dynamic hedging and cast them as stochastic control problems. We then derive the classical results of Merton on portfolio optimization and Black and Scholes on option pricing. In particular, we emphasize a control theory perspective. Next, we discuss extensions to the classical models that involve more complex dynamics, transaction costs, and constraints. We then highlight via new methods and examples how advances in contemporary control techniques, such as stochastic receding horizon control, are providing the right set of tools to solve these more challenging problems.

BIOGRAPHY

Primbs' research involves the application of control and dynamical systems theory to complex problems in finance, business, and economics. He has applied these principles in areas such as derivative securities, risk management, and modeling and analysis of financial markets. Due to the complexity of these problems, the solutions often involve advanced mathematical and computational techniques, which Primbs' research develops and utilizes. For a complete list of Primbs' courses, publications, and collaborations see his [personal site](#).

For more information, contact: Prof. Harish Bhat, 228-4063, hbhat@ucmerced.edu