

BI-CO MATHEMATICS COLLOQUIUM

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“Maximum Likelihood Estimation for Discretely Observed Multivariate Vasicek Processes”

Monday, November 22, 2021

Talk at 4:00 – Hilles 109

Abstract:

Bonds play a major role in the well-balanced diversified portfolio because of low correlation with other asset classes. A pure discount or a zero-coupon bond is a contract that does not involve intermediate interest payments but is traded at a deep discount, rendering profit at the maturity time when redeemed for its full face value. As investment funds can create robust diversified portfolios with bonds, it is imperative that multiple bonds be analyzed simultaneously. The classical Vasicek model studies individual zero-coupon bonds and assumes the instantaneous interest rate follows a mean reverting process.

In this talk, we consider an extension of the original Vasicek model to multiple zero-coupon bonds. The resulting coupled model is given by a stochastic differential equation driven by a p -dimensional white noise. Given a set of observations over an equispaced time grid, our goal is to calibrate the system to be able to forecast the dynamics of future short rates, which, in turn, plays a crucial role in risk management, portfolio optimization and other applications.

This is joint work with Ebenezer Nkum and Thomas M. Fullerton, Jr. (The University of Texas at El Paso).