



2008 Colloquium Series

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Time: 3:00 - 4:00 PM

Room: BSE 2.102

Derivation of Stochastic Differential Equations

Abstract: A procedure is explained for deriving stochastic differential equations (SDEs) for randomly-varying problems in biology, physics, and finance. The SDEs are derived from basic principles, i.e., from the changes in the system which occur in a small time interval. In the derivation procedure, a discrete stochastic model is first constructed. As the time interval decreases, the discrete stochastic model leads to a system of Itô stochastic differential equations. In certain cases, as intervals of other discrete variables decrease, stochastic partial differential equations (SPDEs) are derived. Several examples illustrate the procedure. In particular, stochastic differential equations derived in the talk include: a general population dynamics SDE, a stock price SDE, a neutron transport SPDE, a cotton-fiber breakage SPDE, and a size-and age-structured population dynamics SPDE.