MICHIGAN STATE UNIVERSITY
Department of Statistics and Probability

COLLOQUIUM

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Some problems in spatial modeling: multivariate random fields and simulation

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10:20 a.m. - 11:10 am
Refreshments 10:00 am
C405 Wells Hall

Abstract

Most modern spatial datasets involve multiple variables that can exhibit complex cross-process dependencies. I review some classic approaches to building statistical models for multivariate spatial data, nearly all of which rely on specifying cross-covariance functions. I introduce an alternative viewpoint in the spectral domain that helps to illustrate fundamental limitations on existing models, and suggests insights and dangers of popular constructions. In the second half of the talk I will focus on high resolution simulation methods for nonstationary Gaussian random fields. For small spatial networks, simulations can be produced using direct manipulations of the covariance matrix. Larger high resolution simulations are most easily available for stationary processes, where algorithms such as circulant embedding can be used to simulate a process at millions of locations. I introduce a consecutive conditioning framework to approximate high resolution simulations for nonstationary processes, which can be theoretically motivated by examining decay rates of interpolation weights.

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