# Tail Estimation of Spectral Density under Infill Asymptotics

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## Abstract

For spatial statistics, two asymptotic approaches are usually considered: increasing domain asymptotics and infill asymptotics (or fixed domain asymptotics).For increasing domain asymptotics, the sampled data increase with the increasing spatial domain, while under infill asymptotics, the data are observed on a fixed region with the distance between neighboring observations tending to zero. The consistency and asymptotic results under these two asymptotic frameworks are quite different. The tail behavior of the spectral density dominates the performance of the prediction under infill asymptotics, and the equivalency of the probability measures. In this talk, we consider a stationary Gaussian random field on $\Re^d$ with the spectral density $f(\lambda)$ that satisfies $f(\lambda) \sim c|\lambda|^{-\theta}$ as $|\lambda| \to \infty$ .The parameters $c$ and $\theta$ control the tail behavior of the spectral density where $\theta$ is related to the smoothness of random field and $c$ can be used to determine the orthogonality of probability measures for a fixed $\theta$. For data observed on a grid, we propose estimators of $c$ and $\theta$ by minimizing an objective function, which can be viewed as a weighted local Whittle likelihood and study their asymptotic properties under infill asymptotics (or fixed-domain asymptotics).