

# **Modeling Nonstationary Covariance Using a Linear Combination of Stationary Processes with Varying Coefficients**

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## **Abstract**

Spatial data over a large domain generally shows nonstationary features. However, how to appropriately specify a nonstationary covariance function is difficult and the computation of the corresponding inverse matrix in kriging is also thorny, especially when the data set is massive. In this paper, we develop a methodology for modeling nonstationary process based on a linear combination of stationary processes with spatially varying coefficients. A likelihood-based method, called iterative marginal optimization, is developed for efficiently estimating model parameters. Numerical results show that the proposed methodology provides a satisfactory approximation for the underlying covariance structure and the spatial prediction is also compatible.

Keyword: Cross-covariance, Nonstationarity, Parameter estimation, Positive semidefinite matrix, Spatial prediction