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Spectral Representation of the Covariance Function of a Rotation-Scale-Reflection-Invariant Random Field

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Abstract

A rotation-scale-reflection-invariant (RSRI) random field is defined in the strict sense as a spatial random field whose finite-dimensional distributions are invariant to rotations, rescaling, and reflections of the plane. In the weak sense, a RSRI random field is defined as one whose mean function is constant and whose mean function is constant and whose covariance function depends only on the angle and minimal norm ration between points on the plane. This paper derives the spectral representation of the RSRI covariance function. This is done by utilizing a connection between the covariance functions of RSRI random fields and homogeneous random fields. The results are used to construct an example of a valid RSRI covariance function.

Keywords: *Rotation-scale-reflection-invariant random fields, homogeneous random fields, covariance function, spectral representation*