

Estimation of the spectrum of a spherical random field based on covariances *

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Abstract

We consider isotropic Gaussian random fields defined on the surface of a sphere. These fields can be characterized by a series expansion with respect to the spherical harmonics and by the angular power spectrum [2], [3],[4]. One of the most important examples for spherical random fields is the cosmic microwave background anisotropies, where the estimated spectrum can be used to check the underlying physical theory, while the possible non-Gaussianity can be investigated by estimating the higher order angular spectums. [4]

Using the isotropy and the HEALPix pixelization of the sphere [1] instead of finding the spherical harmonic decomposition we estimate the spectrum with the help of the empirical covariances, which leads to a faster computation.

Keywords: Angular power spectrum, cosmic microwave background radiation, spherical random fields

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