

# Minkowski functionals for isotropic random fields in the Euclidean space and the sphere

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We first introduce the expected Minkowski functional (MF) formulas for the excursion sets of a weakly non-Gaussian smooth isotropic random field. Here, the random field is defined on a bounded index set  $T$  in the Euclidean space. The MF formulas contain the boundary correction terms unless the MFs of the index set  $T$  vanish. In applications in cosmology, only their leading terms proportional to the volume of the index set  $T$  are often used, and the boundary effects are ignored. We numerically evaluate the effects of boundaries in typical settings and demonstrate the importance of boundary corrections.

Next, we discuss the isotropic (orthogonally invariant) random field on the sphere. We show that modifying the Euclidean case obtains the corresponding MF formulas. The resulting formulas are almost the same as the Euclidean case, and we see that the curvature information cannot be detected from the observed MFs. (joint work with T. Matsubara and C. Hikage)

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