
Curvature measures for random excursion sets: theoretical and computational developments

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Résumé

The excursion set of a smooth random field carries relevant information in its various geometric measures. Geometric properties of these exceedance regions above a given level provide meaningful theoretical and statistical characterizations for random fields defined on Euclidean domains. Many theoretical results have been obtained for excursions of Gaussian processes and include expected values of the so-called Lipschitz{-Killing curvatures (LKC), such as the area, perimeter and Euler characteristic in two-dimensional Euclidean space. In this talk we will describe a recent series of theoretical and computational contributions in this field. Our aim is to provide answers to questions like:

- How the geometric measures of an excursion set can be inferred from a discrete sample of the excursion set;
- How these measures can be related back to the distributional properties of the random field from which the excursion set was obtained;
- How the excursion set geometry can be used to infer the extremal behavior of random fields

Mots-Clés: Statistique spatiale, champs aléatoires, extrêmes, statistique géométrique

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