MEAN GEOMETRY OF EXCURSION SETS FOR 2D RANDOM FIELDS

HERMINE BIERMÉ
LMA, University of Poitiers, France
e-mail: hermine.bierme@math.univ-poitiers.fr

AGNÈS DESOLNEUX
CMLA, ENS Cachan, France
e-mail: agnes.desolneux@cmla.ens-cachan.fr

We consider mean geometry of excursion sets for 2D stationary random fields. We adopt a weak functional framework, allowing to get explicit formulas for almost all level of excursion. We introduce the level perimeter and total curvature integrals associated with a real valued function defined on the plane. Using a co-area formula, this permits to compute length and total (signed) curvature of the boundary of excursion sets above almost all level. Thanks to Gauss–Bonnet Theorem, the total curvature is directly related to the Euler Characteristic of the excursion set.

This setting allows explicit computations for the mean geometry of excursion sets of some stationary 2D random fields, beyond the Gaussian smooth framework. In particular, considering shot noise random fields, this generalizes results of the literature about the Boolean model or about random configurations. It also helps to handle discretization effects.

References
