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Title:	Tensor Minkowski Functionals for random fields on the sphere
Authors:	Yogendran, K.P. (/jspui/browse?type=author&value=Yogendran%2C+K.P.)
Keywords:	tensor-valued MinkowskiFunctionals Gaussian and Rayleigh fields
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Citation:	Journal of Cosmology and Astroparticle Physics, 12 (23)
Abstract:	We generalize the translation invariant tensor-valued MinkowskiFunctionals which are defined on two-dimensional flat space to the unit sphere. We apply them to level sets of random fields. The contours enclosing boundaries of levelsets of random fields give a spatial distribution of random smooth closed curves. We outline a method to compute the tensor-valued Minkowski Functionals numerically for any random field on the sphere. Then we obtain analytic expressions for the ensemble expectation values of the matrix elements for isotropic Gaussian and Rayleigh fields. The results hold on flat as well as any curved space with affine connection. We elucidate the way in which the matrix elements encode information about the Gaussian nature and statistical isotropy (or departure from isotropy) of the field. Finally, we apply the method to maps of the Galactic foreground emissions from the 2015 PLANCK data and demonstrate their high level of statistical anisotropy and departure from Gaussianity. Tensor Minkowski Functionals for random fields on sphere
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