RECOGNITION OF CONVEX BODIES BY PROBABILISTIC METHODS

V. K. OHANYAN

Yerevan State University, American University of Armenia, Yerevan, Armenia
E-mail: victo@aua.am

The main purpose of the stereology is to obtain information about the geometric properties of n-dimensional structures, if there is information on the forms of smaller dimensions as through the k-flats (k-dimensional planes) sections ($0 < k \leq n-1$), and with the help of projections on infinitesimal layers. The most popular application is the tomography (see [1] and [2]). Reconstruction of a body over its cross sections is one of the main tasks of geometric tomography, a term introduced by R. Gardner in [1]. If $D \subset \mathbf{R}^n$ ($\mathbf{R}^n$ is n-dimensional Euclidean space) is intersected by k-plane, then arises a k-dimensional section that contains some information on D. A natural question arises whether it is possible to reconstruct D, if we have a subclass of k-dimensional cross-sections. The recognition of bounded convex bodies D by means of random k-flats intersecting D is one of the interesting problems of Stochastic Geometry. In particular, the problem of recognition of bounded convex domains D by chord length distribution function is of much interest (see [3]). One can consider the case when the orientation and the length of the chords are observed. We refer this case as the orientation-dependent chord length distribution. All these problems are the problems of geometric tomography (see [1]), since orientation-dependent chord length distribution function at point y is the probability that parallel X-ray in a fixed direent chord length distribution is equivalent to the investigation of their covariogract ion is less than or equal to y. Investigation of convex bodies by orientation-dependms. The present talk considers some problems and recent results related to covariograms, and their applications to various problems of tomography[4]— [7].

References

[1] R. J. Gardner, Geometric Tomography, Cambridge Univ. Press, Cambridge, UK, 2nd ed., 2006.
[2] R. Schneider and W. Weil, Stochastic and Integral Geometry, Springer-Verlag Berlin Heidelberg, 2008.
[3] H. S. Harutyunyan and V. K. Ohanyan, "Chord length distribution function for regular polygons", Advances in Applied Probability (SGSA), vol. 41, no. 2, pp. 358-366, 2009.
[4] H. S. Harutyunyan, and V. K. Ohanyan, "Orientation-dependent section distributions for convex bodies", Journal of Contemporary Mathematical Analysis (Armenian Academy of sciences), vol. 49, no. 3, 139-156, 20014.
[5] A. G. Gasparyan, and V. K. Ohanyan, "Covariogram of a parallelogram", Journal of Contemporary Mathem. Analysis (Armenian Academy of sciences), vol. 49, no. 4, 17-34, 2014.
[6] H. S. Harutyunyan, and V. K. Ohanyan, "Covariogram of a cylinder", Journal of Contemporary Mathematical Analysis (Armenian Acad of Sciences), vol. 49, no. 6, 366-375, 2014.
[7] A. G. Gasparyan and V. K. Ohanyan, "Orientation-Dependent Distribution of the Length of a Random Segment and Covariogram", Journal of Contemporary Mathematical Analysis (Armenian Acad of Sciences), vol. 50, no. 2, 90-97, 2015.