

Second-order comparison of random curves with application to DNA minicircles

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Key words: Covariance operator, DNA minicircles, functional data analysis, Hilbert—Schmidt norm, principal components analysis, two-sample test.

The problem of comparison of two samples of Gaussian random curves is considered. The work is motivated by the problem of deciding whether base-pair sequences affect the mechanical properties of short strands of DNA. We focus on testing of equality of the covariance structure. The proposed test is based on the common empirical Karhunen—Loève expansion and truncated approximation of the Hilbert—Schmidt distance of the empirical covariance operators. The method is applied to a three-dimensional electron microscopy dataset of DNA minicircles for which it suggests a significant effect of base-pair sequences. Related topics such as registration and alignment of closed curves are also discussed.