

Second-Order Functional Comparison of DNA Minicircles

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Given two samples of continuous random curves, we consider the problem of comparing their covariance structure. Our study is motivated by the problem of determining whether the mechanical properties of short strands of DNA are significantly affected by their base-pair sequence; while this is believed to be true, it has not been confirmed by 3D data. The testing problem is seen to involve aspects of ill-posed inverse problems and a test based on spectral truncation is proposed and investigated for the Gaussian case. When applied to a dataset of DNA minicircles obtained through the electron microscope, our test seems to confirm the existence of a sequence effect on DNA shape.