SMOOTH FUNCTIONALS OF COVARIANCE OPERATORS: MINIMAX ESTIMATION ERROR BOUNDS AND EFFECTIVE RANK

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We will discuss the problem of statistical estimation of smooth functionals of unknown covariance operator of high-dimensional and infinite-dimensional Gaussian models with complexity of the problem characterized by the effective rank of the covariance. The estimation method is based on linear aggregation of plug-in estimators based on sample covariance operators with different sample sizes. Such estimators provide higher-order bias reduction which, along with Gaussian concentration, yield minimax error rates in functional estimation problems with optimal dependence on the sample size, the effective rank of the covariance and the degree of Hölder smoothness of the functional.