Approximation complexity of random fields with large parametric dimension

We study approximation properties of centered second order random fields $Y_d(t)$, where $d \in \mathbb{N}$ is a dimension of the parameter t. We focus on tensor product-type and additive random fields, which have covariance functions of corresponding product and additive form. The *average case approximation complexity* $n^{Y_d}(\varepsilon)$ is defined as the minimal number of evaluations of arbitrary linear functionals that is needed to approximate Y_d with normalized 2-average error not exceeding a given threshold $\varepsilon \in (0,1)$. We consider the quantity $n^{Y_d}(\varepsilon)$ as a function of two variables $d \in \mathbb{N}$ and $\varepsilon \in (0,1)$ and investigate its growth. There exist two natural settings for this multivariate problem. The first setting is obtaining upper bounds for $n^{Y_d}(\varepsilon)$ for arbitrary ε and d (*tractability* questions). The second setting is an asymptotic analysis of $n^{Y_d}(\varepsilon)$ for fixed ε and $d \to \infty$. In the talk we will review important existing results for these settings and illustrate the results by well known examples.