Optimal approximation by least square methods

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Least squares methods are of common use when one needs to approximate a function based on its noiseless or noisy observation at n scattered points by a simpler function chosen in an m dimensional space with m less than n. Depending on the context, these points may be randomly drawned according to some distribution, or deterministically selected by the user. In this talk, I shall analyze the stability and approximation properties of least squares method, in relation with the spatial distribution of the sampling. Applications will be discussed in acoustics and high-dimensional parametric PDEs.