Low-Rank Tensor Methods for High-Dimensional Eigenvalue Problems

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We consider PDE eigenvalue problems on a tensorized domain, discretized such that the resulting matrix eigenvalue problem exhibits Kronecker product structure. In particular, we are concerned with the case of high dimensions, where standard approaches to the solution of matrix eigenvalue problems fail due to the exponentially growing degrees of freedom. Recent work shows that this curse of dimensionality can in many cases be addressed by approximating the desired solution vector in a low-rank tensor format. In this talk, we survey recent developments in this direction. Particular emphasis is placed on a priori approximation results and the use of preconditioners. Based on joint work with Michael Steinlechner, Christine Tobler, and Andre Uschmajew.

References:

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