Optimization with tensor products of fixed rank

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We consider the numerical treatment of several variational problems, including least squares approximation, solution of operator equations, eigenvalue computation etc. Searching for an approximate optimizer of finite and possibly small tensor rank we confine the admissible set to tensors of a given rank. This leads to corresponding but slightly different optimization problems, which can be treated by local and global optimization techniques. We give a description of the corresponding gradients and Hessians and consider the question of preconditioning.

The talk is based on joint work with M. Espig, W. Hackbusch, and T. Rohwedder.