On discrete ground states of rotating Bose–Einstein condensates

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The talk focuses on the study of ground states of Bose–Einstein condensates in a rotating frame. The ground states are described as the constrained minimizers of the Gross-Pitaevskii energy functional with an angular momentum term. The problem is discretized using Lagrange finite element spaces of arbitrary polynomial order. The approximation properties of discrete ground states are presented, taking into account the missing uniqueness of ground states which is mainly caused by the invariance of the energy functional under complex phase shifts. The error analysis is based on an Euler–Lagrange functional that we restrict to certain tangent spaces in which we have local uniqueness of ground states. Error estimates of optimal order are shown for the L^2- and H^1-norm, as well as for the ground state energy and chemical potential. We also present numerical experiments to illustrate various aspects of the problem structure.

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