Symmetry breaking for rotating waves in elliptic and elliptic-hyperbolic settings

We study solutions of nonlinear wave equations whose time dependence is characterized by a rotation. In the first part of this talk, we consider angular velocities smaller than 1, which leads to a (degenerate) elliptic equation where, in order to produce genuine rotating solutions, we investigate the existence of nonradial ground states. We show that symmetry breaking occurs in several parameter regimes. This is based on new degenerate Sobolev inequalities in the half space whose properties are further studied.

In the second part, we then consider velocities greater than 1, which leads to an elliptic-hyperbolic equation. Based on a detailed study of the spectrum of the associated mixed type operator, we formulate a suitable variational framework to find ground state solutions and prove their nonradiality.

This is partly based on joint work with Tobias Weth.