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Heteroclinic cycles and modulated travelling waves in systems with $O(2)$ symmetry. (English)

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Summary: We analyze unfoldings of a codimension two, steady-state/steady-state modal interaction possessing $O(2)$ symmetry. At the degenerate bifurcation point there are two zero eigenvalues, each of multiplicity two. The spatial wavenumbers of the critical modes k_i are assumed to satisfy $k_2 = 2k_1$. We base our analysis on a detailed study of the third order truncation of the resulting equivariant normal form, which is a four-dimensional vector field. We find that heteroclinic cycles and modulated travelling waves exist for open sets of parameter values near the codimension two bifurcation point. We provide conditions on parameters which guarantee existence and uniqueness of such solutions and we investigate their stability types. We argue that such motions will be prevalent in continuum systems having the symmetry of translation and reflection with respect to one (or more) spatial directions.

MSC:

34C25 Periodic solutions to ordinary differential equations

37G99 Local and nonlocal bifurcation theory for dynamical systems

Cited in **3** Reviews
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Keywords:

degenerate bifurcation point; eigenvalues

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