

Busse, F. H.; Riahi, N.

Mixed-mode patterns of bifurcations from spherically symmetric basic states. (English)

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A number of patterns are derived which are likely to occur in bifurcations from spherically symmetric basic states when two neighbouring degrees l and l^* of spherical harmonics yield nearly the same lowest value of the control parameter. The analysis is motivated primarily by the problem of convection in spherical shells in which case the Rayleigh number is the control parameter. But the formulation is kept general such that the results remain applicable to other problems as well. In contrast to the case of a single-degree l describing the bifurcating solution, the preferred patterns depend on the parameters of the physical problem. But their symmetry properties are likely to be preserved over a wide range of the parameter space. The new patterns are characterized by one, three, four and seven cells distributed over the spherical surface.

MSC:

76E99 Hydrodynamic stability

76E15 Absolute and convective instability and stability in hydrodynamic stability

76M99 Basic methods in fluid mechanics

Cited in **6** Documents

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spherically symmetric basic states; spherical harmonics; control parameter; problem of convection in spherical shells

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