Global bifurcation analysis of semiconductor lasers: theory and experiment

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Abstract

This talk discusses two- and three-parameter studies of global bifurcations in an optically injected semiconductor laser—an example of a widely applied and technologically relevant forced nonlinear oscillator. Specifically, it presents numerical study of homoclinic orbits to a saddle-focus which include cascades of accumulating n-homoclinic bifurcations as well as double homoclinic and T-point bifurcations. On the one hand, the injection laser emerges as a system that allows studies of n-homoclinic orbits in a vector field from applications. On the other hand, the resulting intricate bifurcation diagram is of physical relevance. It is associated with a phenomenon of multi-pulse excitability and stimulated a series of real laser experiments.