Bifurcation analysis of laser systems with optical delays

Bernd Krauskopf
Department of Engineering Mathematics
University of Bristol
University Walk
Bristol, Avon BS8 1TR
UNITED KINGDOM
B.Krauskopf@bristol.ac.uk

Abstract

Laser systems with delayed optical feedback or coupling have emerged as important motivating and test-bed examples in the recent development of bifurcation analysis tools for delay differential equations (DDEs). The goal of this presentation is to showcase the state of the art with a concrete physical example, namely a semiconductor laser with delayed filtered feedback, where a part of the output of the laser re-enters after spectral filtering. A series of bifurcation diagrams in the plane of feedback strength versus feedback phase reveals how stability regions of different types of oscillations depend on the filter frequency. The results are compared with recent experimental measurements.

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