

# OPTICAL CHOAS: DYNAMICAL COMPLEXITY OF DELAY-COUPLED SEMICONDUCTOR LASERS SYSTEM

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**M**utually delay-coupled semiconductor lasers system show a plethora of dynamical complexity in the emitted radiation due to phase-amplitude coupling factor  $\alpha$ ,  $\alpha$  that make them ideal candidate for fundamental studies of coupled oscillators as well as for practical applications ranging from optical communications to computing. On the one hand these dynamical instabilities are undesired features and disturb the many applications where one needs the constant stable high power but on the other hand they may allow for new methods for secure communications using chaos synchronization. The variety of optical complexity in these systems which we have investigated theoretically as well as experimentally is well behaving, well understandable, well classifiable in terms of complex nonlinear dynamics. So the systematic study and control of these nonlinear dynamics provides fundamental insight into the underlying physics of the system, on the basis of which one can redesign the device in order to stabilize the working point against environmental fluctuations or improve the processing, or simply exploit the dynamical performance of a system to one's advantages.

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