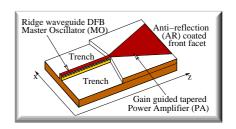# BALaser

Simulation of dynamics in high-power broad-area semiconductor lasers
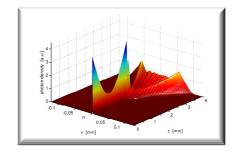
Product

BALaser is a software tool for simulation of the nonlinear dynamics in high-power edge-emitting **B**road-**A**rea semiconductor **Laser**s. It integrates numerically the laterally extended dynamic traveling wave model (1 [time] + 2 [space] - dimensional PDE) describing the propagation of optical fields along the longitudinal axis of the laser device and their diffraction in the (single) lateral direction, as well as the evolution of the carrier density governed by the rate equation with included lateral diffusion and inhomogeneous current spreading effects.
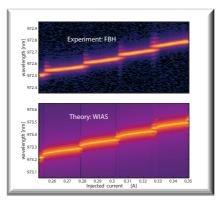

Key Benefits

We provide an efficient simulation tool for nonliner dynamics in various broad-area semiconductor laser devices with different heterostructures. This software is used for optimizing existing lasers and creating novel laser design concepts:

- Master-oscillator power-amplifier lasers
- Pulse propagation in tapered power amplifiers
- Beam quality improvement by an off-axis optical feedback
- Laser stabilization by a dual off-axis optical injection
- Lateral beam shaping in amplifiers with spatially modulated electrical contacts
- The impact of an inhomogeneous current spreading
- Lasers with an optical feedback from different external cavities
- etc.

Key Features

BALaser BALaser allows an efficient simulation of the large-scale problem defined in one temporal and two spatial dimensions. Once operating in parameter-tuning modus, the effective dimensionality of the problem is four or five. The software is designed for its usage on multicore computers, typically exploring ten to fifty cores for a single simulation. In addition to the integration of model equations, the software executes different data post-processing routines and visualizes the obtained data.

Our Service

- Individual consulting
- Joint problem definition and search for solutions
- Model adaptation and implementation conforming to customers requirements
- Rapid and reliable implementation and support

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