

BALaser

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

Product

BALaser is a software tool for simulating the nonlinear dynamics in high-power edge-emitting **Broad-Area** semiconductor **Lasers**. It integrates numerically the dynamic traveling wave model for optical fields and carrier density defined in two spatial dimensions. When necessary, it also accounts for inhomogeneous current spreading and heat flow defined in all three spatial dimensions.

Key Benefits

We provide an efficient simulation tool for nonlinear 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, including:

- Master-oscillator power-amplifier lasers
- Pulse propagation in tapered power amplifiers
- Beam quality improvement through off-axis optical feedback
- Laser stabilization via dual off-axis optical injection
- Lateral beam shaping in lasers and amplifiers with spatially modulated electrical contacts
- The impact of heating and inhomogeneous current spreading
- Lasers with optical feedback from different external cavities
- Beam combining in coupled laser systems
- etc.

Key Features

BALaser allows efficient simulation of the large-scale multiphysics problem defined in one temporal and two spatial dimensions when calculating optical fields and carrier density, and in all three spatial dimensions when accounting for current spreading and temperature. When operating in parameter-tuning mode, the effective dimensionality of the problem becomes four or five. The software is designed to run on multicore computers, typically utilizing ten to fifty cores for a single simulation. In addition to integrating model equations, the software executes various 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

Dr. M. Radziunas

Weierstrass Institute for Applied Analysis and Stochastics · Mohrenstraße 39 · 10117 Berlin · Germany
 Fon 030 203 72-441 · radziunas@wias-berlin.de · www.wias-berlin.de/software/balaser

