Spatiotemporal Gaussian pulse dynamics in Kerr-lens mode-locked lasers

Abstract:
The spatiotemporal dynamics of Kerr-lens mode-locked lasers is described by means of equations of motion obtained from a variational ansatz. Included are dispersion and self-phase modulation as temporal, and diffraction and self-focusing as spatial, effects. The system has steady-state solutions considering only these energy-conserving effects. The Kerr-lens mode-locking (KLM) action and gain filtering can be considered a perturbation to this dynamics. By imposing suitable boundary conditions at the end mirrors, steady-state solutions can be obtained directly from the equations of motion. The approach is used for studying the steady-state dynamics of a KLM laser system. The variational results are compared with spatiotemporal simulation.

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