

Study of Microintegrated External-Cavity Diode Lasers: Simulations, Analysis, and Experiments

**Mindaugas Radziunas, Vasile Z. Tronciu,
Erdenetsetseg Luvsandamdin, Christian Kürbis,
Andreas Wicht, Hans Wenzel**

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Abstract

This paper reports the results of numerical and experimental investigations of the dynamics of an external-cavity diode laser device composed of a semiconductor laser and an external Bragg grating, which provides optical feedback. Due to the influence of the feedback, this system can operate in different dynamic regimes. The traveling-wave model is used for simulations and analysis of the nonlinear dynamics in the considered laser device. Based on this model, a detailed analysis of the optical modes is performed, and the stability of the stationary states is discussed. It is shown that the results obtained from the simulation and analysis of the device are in a good qualitative agreement with the experimental findings.