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## Study of the optical feedback-induced noise in semiconductor lasers and applications to the optic disc system

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### Abstract

The dynamics and noise of semiconductor lasers under optical feedback (OFB) have been simulated. The study is performed as applied to an optic-disc system in which laser radiation is reflected by the disc surface and re-injected into the laser cavity. We examine the possibility of suppressing OFB-induced noise in the optic-disc system by the technique of superposition of high-frequency current. The study is based on numerical integration of the time-delay rate equations of semiconductor lasers under OFB. The laser noise is evaluated in terms of the spectral profile of relative intensity noise (RIN). It is shown that RIN is enhanced when states of chaos are generated, and attains minimum levels under continuous-wave operation just before the laser starts the route to chaos. The suppression of RIN in the low-frequency regime is achieved when the superposition-current frequency exceeds the laser resonance frequency by factors of 0.8, 1.0, and 1.1 and when the modulation depth exceeds 0.4.

### Keywords

**KeyWords Plus:** INTENSITY NOISE; CHAOS; FLUCTUATIONS; SUPPRESSION; MODULATION; DYNAMICS

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