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Dynamics of 980 nm VCSELs Characterized Using Temperature Dependent RIN Spectra RASHID SAFAISINI, AHMAD N. AL-OMARI, JOHN R. JOSEPH, KEVIN L. LEAR, ECE Department, Colorado State University —
High speed optical interconnects are replacing copper connections in ever shorter link distance, low cost, high speed communication systems employing directly modulated laser diodes. In very short distance systems (<1 m), laser diode bandwidth is a major limitation. Laser intensity noise spectra contain valuable information on laser dynamics including resonant frequency and damping. In this work, vertical cavity surface emitting lasers (VCSELs) are fabricated from a metal-organic chemical vapor deposition (MOCVD) grown AlGaAs structure on an n-type substrate. The intrinsic resonance frequency and damping constant of 980 nm VCSELs are measured. Two methods are used: constant temperature and varying injection current and constant injection current with varying temperature. After fitting the spectra to the conventional damped oscillator model to extract resonance frequency and damping, K-factor analysis is performed both on the conventional constant temperature data as well as the constant current data. The results of the two approaches are compared.

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