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| **Title:** | Effects of Reducing Active Radius on Modulation Performance and Relative Intensity Noise of a Strained In0.2Ga0.8As/GaAs 80A0 QW VCSEL | | | |
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| **Abstract:** |  |
| In this work, the effects of variation of active radius on modulation response of a strained In0.2Ga0.8 As/GaAs80A0 QW VCSEL have been presented after performing numerical computations on a chosen VCSEL structure. From the obtained computational results it has been observed that the resonance frequency of a VCSEL increases with the decrease of active radius. A resonance frequency of nearly 3.72 GHz was obtained after computing with an initial value of the active radius of 6 μm. An increase of resonance frequency upto 8.44 GHz has been obtained by reducing the active radius to 3 μm at an injection current of 3 mA. An enhancement of resonance frequency from 8.44 to 9.68 GHz is obtained by increasing the injection current from 3 to 3.88 mA. This enhancement of resonance frequency corresponds to an enhancement of bandwidth from 13 to 15 GHz. The active radius cannot be decreased after a certain limit because a large reduction of active radius increases the diffraction loss which will degrade the performance of the laser. For analog modulation applications, the relative intensity noise (RIN) is computed by varying active radius in this work. It has been observed that RIN decreases with the decrease of active radius. By reducing the active radius from 6 to 3 μm the RIN of a VCSEL is decreased upto −157.89 dB/Hz. | |