Abstract

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Employing wavelength diversity to improve SOA gain uniformity

In this paper, we propose a wavelength diversity technique for the semiconductor optical amplifier (SOA) to improve the gain uniformity for ultra-high speed optical routers. In such routers, fast SOA gain recovery is required to ensure the minimum gain standard deviation and thus leading to reduction in the system power penalty. The SOA is modeled using a segmentation technique and the detailed theoretical analysis for the model is presented. A direct temporal analysis of the impact of the signal wavelength on the SOA gain is investigated. The SOA gain profile when injected with a burst of input Gaussian pulses for a single wavelength and the proposed wavelength diversity technique are investigated. The operation principle is simulated and the results show a reduction in the gain standard deviation (at 1 mW input power) of 13.1, 11, 8.1, 6.2 and 4.8 dB for the data rates of 10, 20, 40, 80 and 160 Gb/s, respectively.