

# **Abstract**

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## **SOA Output Characteristics: Effect of Amplifier Length and Injected Carrier Density**

This work focuses on the numerical analysis of SOAs. The model is based on the carrier density rate equation and a set of traveling wave equations describing the amplified signal fields and spontaneous emission photon rates. The material gain coefficient, carrier density distribution, total amplified spontaneous emission output power, signal output power, output saturation power, fiber to fiber gain, small signal gain spectrum and bandwidth are described for various SOAs operation conditions. In particular, we present their dependence on the active region length and the biasing current. The obtained results are useful to point out the best device length and operation conditions to achieve desired functionality based on SOAs.