

# **Abstract**

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## **EDFA Gain Dynamics Using Different Concentration Profiles**

This paper gives a numerical investigation of the ordinary differential equation (ODE) describing the erbium doped fiber amplifier (EDFA) gain dynamics, bringing into greater evidence the physical meaning of the amplification process, and greatly enhancing the utility of the ODE as an analysis and a design tool. The effects on the amplifier dynamics by several parameters are studied. In addition, a comparative study is presented between different erbium concentration profiles according to their dynamic behavior in order to judge their performance. The optimal doping method, leading to the maximum gain and minimum settling time, is determined.