عنوان مقاله:

A Proposal for a New Method of Modeling of the Quantum Dot Semiconductor Optical Amplifiers

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خلاصه مقاله:

With the advancement of nanoscale semiconductor technology,semiconductor optical amplifiers are used to amplify and process all-optical signals. Inthis paper, with the aim of calculating the gain of quantum dot semiconductor opticalamplifier (QD-SOA), two groups of rate equations and the optical signal propagatingequation are used in the active layer of the device. For this purpose, the relatedequations are presented coherently. In our model, the rate equations that are ordinarydifferential equations (ODE) are solved by the Runge-Kutta method. The rate equationsare based on the occupation probabilities of the energy levels instead of the carrierdensities. On the other hand, the signal propagating equation is a partial differentialequation (PDE) and is solved by using the SLICE technique. Therefore, a suitablesolution for numerical modeling is presented. Based on the presented method, modelingis implemented in the MATLAB environment. The modeling results show a remarkableaccuracy of the model. Also, the proposed model is simple and the runtime is too shortin comparison with other similar models.

کلمات کلیدی:

Numerical Modeling, Gain, Optical Amplifier, Quantum Dot Semiconductor