Pulse propagation in a two-pass optical amplifier with arbitrary laser beams overlap

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Abstract
An analytical model for two-pass optical amplifier with arbitrary beams overlap has been developed which generalized the classical theory of Frantz-Nodvik for single pass amplifier. The effect of counterpropagating beams on gain and output energy fluence included in the model. Moreover, the appropriate limiting relations for two special cases of weak input signal and saturation state of the amplifier gain have been derived. The results indicate that for complete beams overlap, the gain and output energy have the least values. The model predictions are consistent with experimental observations and exact analytical model for two-pass amplifier when beam propagation paths are coincided.

Keywords: optical amplifiers, multi-pass amplifiers, rate equations.

For full article, refer to the Persian section