

Particle swarm optimization on threshold exponential gain of stimulated Brillouin scattering in single mode fibers.

ABSTRACT

We implement a particle swarm optimization (PSO) algorithm to characterize stimulated Brillouin scattering phenomena in optical fibers. The explicit and strong dependence of the threshold exponential gain on the numerical aperture, the pump laser wavelength and the optical loss coefficient are presented. The proposed PSO model is also evaluated with the localized, nonfluctuating source model and the distributed (non-localized) fluctuating source model. Using our model, for fiber lengths from 1 km to 29 km, the calculated threshold exponential gain of stimulated Brillouin scattering is gradually decreased from 17.4 to 14.6 respectively. The theoretical results of Brillouin threshold power predicted by the proposed PSO model show a good agreement with the experimental results for different fiber lengths from 1 km to 12 km.

Keyword: Nonlinear optics; Fibers; Scattering; Stimulated; Stimulated Brillouin.