

Analytical analysis of second-order Stokes wave in Brillouin ring fiber laser.

ABSTRACT

This paper details a theoretical modeling of Brillouin ring fiber laser which incorporates the interaction between multiple Brillouin Stokes signals. The ring cavity was pumped at several Brillouin pump (BP) powers and the output was measured through an optical coupler with various coupling ratios. The first-order Brillouin Stokes signal was saturated with the presence of the second-order Stokes signal in the cavity as a result of energy transfer between them. The outcome of the study found that the optimum point for the first-order Stokes wave performance is at laser power reduction of 10%. Resultantly, at the optimum output coupling ratio of 90%, the BFL was able to produce 19.2 mW output power at BP power and Brillouin threshold power of 60 and 21.3 mW respectively. The findings also exhibited the feasibility of the theoretical models application to ringtype Brillouin fiber laser of various design parameters.

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