20 GHz spacing multi-wavelength generation of Brillouin-Raman fiber laser in a hybrid linear cavity

ABSTRACT

We demonstrate a tunable multi-wavelength Brillouin-Raman fiber laser with 20 GHz wavelength spacing. The setup is arranged in a linear cavity by employing 7.2 and 11 km dispersion compensating fibers (DCF) in addition to a 30 cm Bismuth-oxide erbium doped fiber. In this experiment, for the purpose of increasing the Stokes lines, it is necessary to optimize Raman pump power and Brillouin pump power together with its corresponding wavelengths. At the specific Brillouin pump wavelength, it is found that the longer length of 11 km DCF with optimized parameters results in larger number of Stokes combs and optical signal to noise ratios (OSNRs). In this case, a total of 195 Brillouin Stokes combs are produced across 28 nm bandwidth at Brillouin pump power of −2 dBm and Raman pump power of 1000 mW. In addition, all Brillouin Stokes signals exhibit an average OSNR of 26 dB.

Keyword: Fiber laser; Brillouin-Raman fiber laser; Brillouin scattering; Stimulated Raman scattering.