

Tunable Raman fiber laser induced by Rayleigh backscattering in an ultra-long cavity.

ABSTRACT

We report an ultra-long Raman laser with a 46 km fiber length that behaved as a Rayleigh back-scattering–based optical feedback. The laser was tunable from 1550 nm to 1571 nm (3 dB bandwidth) with the insertion of an optical grating filter. Evaluations on the spectral evolution and power development were also performed from the results obtained. In fact, it was discovered that the spectral broadening effect between the modeless spectra resembled the same process that happens in a typical fiber cavity that has high reflectors at each cavity end. In addition, the output power showed a square-root development with respect to the input power.

Keyword: Raman fiber laser; Rayleigh scattering; Spectral broadening.