

## **Double spacing multi-wavelength L-band Brillouin erbium fiber laser with Raman pump**

### **ABSTRACT**

A new multi-wavelength Brillouin erbium fiber laser (BEFL), which operates in the L-band region with double frequency Brillouin spacing, is demonstrated. This design uses a Raman pump (RP) and a piece of 2 km highly nonlinear fiber as a gain medium. The double frequency spacing is achieved by employing a dual ring configuration, which is formed by utilizing a four-port circulator that removes the odd-order Stoke signals. Twenty Stokes and seventeen anti-Stokes lines, which have optical signal to noise ratio (OSNR) greater than 15 dB, are generated simultaneously with a spacing of 0.16 nm when Brillouin pump and RP powers were fixed at the optimum values of 8 dBm and 40 mW, respectively. The BEFL can be tuned in the range between 1591 nm to 1618 nm. The proposed configuration increases the number of lines generated and the OSNR, and thus allows a compact multi-wavelength laser source to be realized.

**Keyword:** Brillouin erbium fiber laser; Double frequency spacing; Highly nonlinear fiber; Multi-wavelength laser