Widely Tunable Sampled-Grating Distributed Bragg Reflector Lasers

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ABSTRACT

As the number of wavelengths in networks continues to increase, tunable lasers will play an increasingly important role towards enabling the dynamic intelligent network. In my thesis, we study widely tunable sampled grating distributed Bragg reflector (SG-DBR) lasers. First of all, we simulate the spectra of the sampled gratings, derive the oscillation conditions, and simulate the characteristics of oscillation conditions such as oscillation wavelengths, the threshold gain and spectra of the sampled gratings with and without current injection in the sampled grating sections. In addition, we demonstrate that the SG-DBR laser can tune from 1521 nm-1573 nm, the line-width of the SG-DBR laser is 4.7 MHz, and switching time < 200 ns. Further, we demonstrate the SG-DBR laser can provide 40 ITU wavelength channels of 100GHz channel spacing with side-mode suppression ratio (SMSR) > 40dB, output power greater than 7dBm, and wavelength stability better than ± 1 GHz.