Side-mode suppression ratio of the wavelength tunable actively mode-locked Fabry-Perot laser

Abstract
Side-mode suppression ratio of the wavelength tunable actively mode-locked Fabry-Perot laser with chirped fiber Bragg grating as an external cavity is investigated with numerical analysis. It is observed that the side-mode suppression ratio (SMR) is strongly affected by the facet reflectivity between the laser and the external cavity.

Introduction
The side-mode suppression ratio of the wavelength tunable actively mode-locked laser is critically dependent on the cavity design and the external cavity. In this work, we investigate the SMR of the actively mode-locked Fabry-Perot laser with a chirped fiber Bragg grating (CFBG) as the external mirror.

Structure and Model of Two-Mode External Cavity Laser

The model of the two-mode external cavity laser is given by

$$\begin{align*}
\dot{\mathbf{X}} &= \mathbf{A} \mathbf{X} + \mathbf{B} \mathbf{U}, \\
\mathbf{Y} &= \mathbf{C} \mathbf{X} + \mathbf{D} \mathbf{U},
\end{align*}$$

where $$\mathbf{X}$$ is the state vector, $$\mathbf{U}$$ is the input vector, and $$\mathbf{Y}$$ is the output vector. The matrices $$\mathbf{A}$$, $$\mathbf{B}$$, $$\mathbf{C}$$, and $$\mathbf{D}$$ are the system matrices.

Conclusion
We have demonstrated the side-mode suppression ratio of the actively mode-locked Fabry-Perot laser with a chirped fiber Bragg grating as the external cavity. The SMR is strongly affected by the facet reflectivity between the laser and the external cavity.
Results

Figure 2 is λ=1554.4 nm in mode p and λ=1553.6 nm in mode q of the output in the time domain from the laser. This data is the bias of 1.5V and RF is 25600 MHz. The figure shows the output spectrum of the laser with mode p at different wavelengths. The figure shows the output spectrum of the laser with mode p at different wavelengths.

Figure 3 shows the spectrum of mode q with a resolution of 2.4GHz. The figure shows the output spectrum of the laser with mode p at different wavelengths. The figure shows the output spectrum of the laser with mode p at different wavelengths.

Figure 4 shows the output spectrum of the laser with mode p at different wavelengths. The figure shows the output spectrum of the laser with mode p at different wavelengths. The figure shows the output spectrum of the laser with mode p at different wavelengths.

Reference