

Note: spectral measurement of single longitudinal mode laser diodes

We observed that the measurement of the lineshape of a single longitudinal mode laser with an OSA can vary significantly when the multimode fiber, bringing the signal to the OSA, is bent. This is attributed to a change of the spatial mode at the end of the multimode fiber, caused by bending or environmental changes (temperature e.g), over time. Therefore, the lineshape of a single mode longitudinal laser measured by an OSA, with a multimode fiber feed, should not be used as a quantitative measure of a single mode laser's spectral stability.

The OSA used in these measurements is Model AQ6315A from Ando. The maximum resolution of the spectrometer is 0.05nm.

A Fabry-Perot (FP) spectrum analyzer with 1.5GHz free spectral range and 7.5MHz resolution. (Thorlabs model SA200-6A) is used in tandem with the OSA as figure 1 illustrates.

The FP measurement is a more reliable method to determine linewidth. A linewidth of less than 50 MHz is consistently obtained using the FP system.

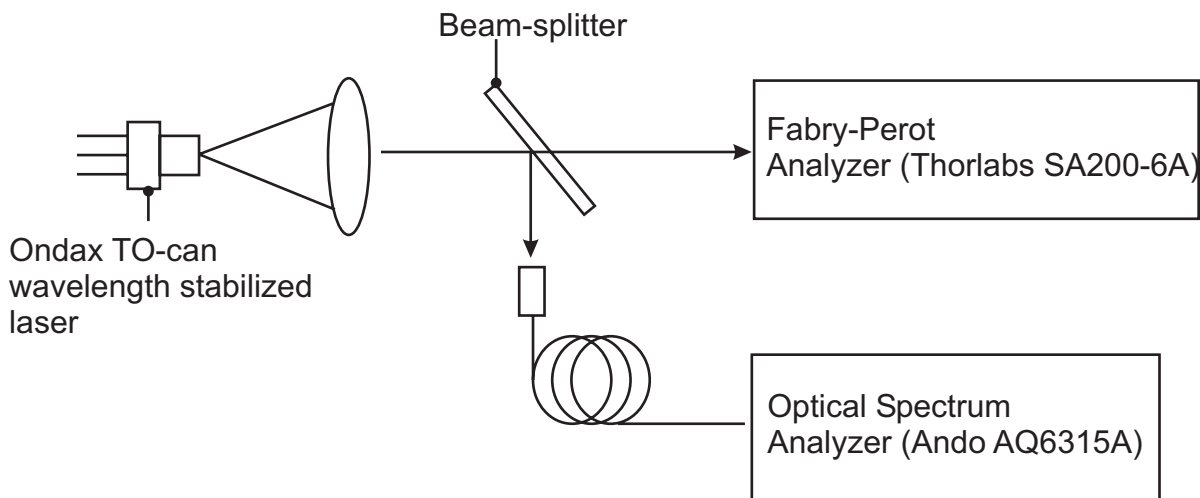


Figure 1: Set-up

The spectra of figure 2 are obtained with the OSA. The multimode fiber was slightly bent before each measurement. Simultaneously, the spectra from the Fabry-Perot analyzer was recorded (figure 3 left and right).

Figure 3 shows a single line (50MHz linewidth) at each Free Spectral range (FSR) of the Fabry-Perot analyzer. The Fabry-Perot scanned through four FSR in the graphs. Figure 3 left and right are indiffereniable whereas the OSA measurement in figure 1 shows a mode structure separated by 0.1 nm (50GHz). The mode structure measured in figure 2 is an artifact of the OSA measurement and not a real measure of the side mode structure of the laser diode

Figure 2

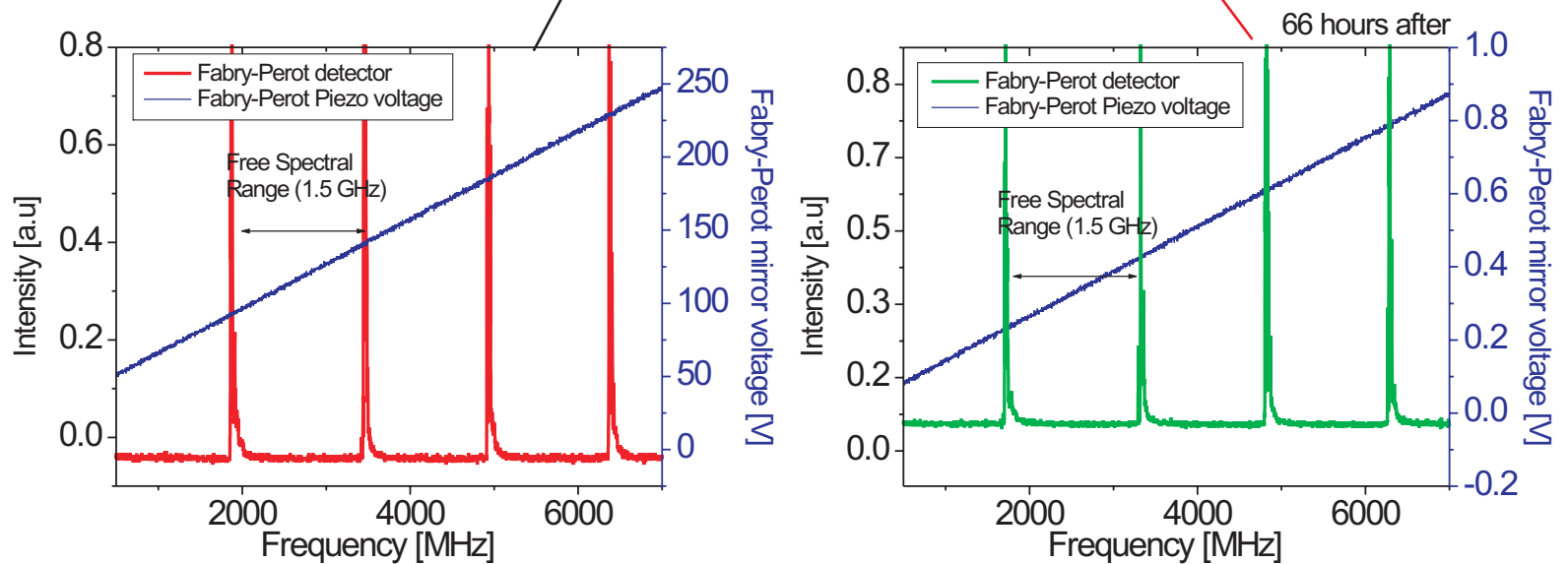
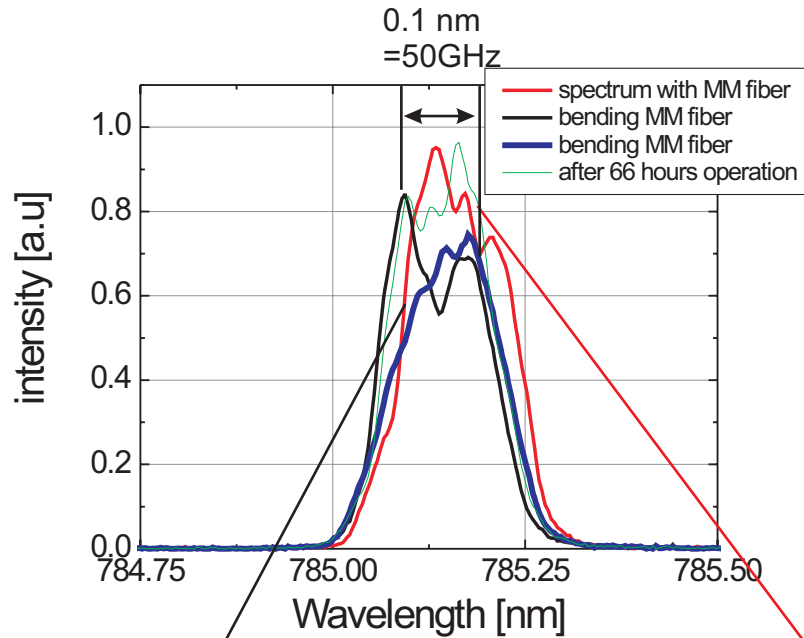


Figure 3