**The improvement of the polarization extinction technique by using polarization beam splitter for measuring amplifier spontaneous emission in optical amplifier**

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**Abstract:** We use polarization characteristics of the polarization beam splitter (PBS) to improve the optical path of the polarization extinction technique for measuring the amplifier spontaneous emission (ASE). Thus we can obtain a more efficient optical path for measuring the ASE in the erbium-doped fiber amplifier. Based on experimental data, we discussed the convenience and efficiency of this improvement.

Polarization extinction method is used to measure the ASE in the EDFA. By measuring the ASE, the Gain (G) and Noise Figure (NF)of the EDFA can be calculated. These two parameters are important reference values for the EDFA performance standard.

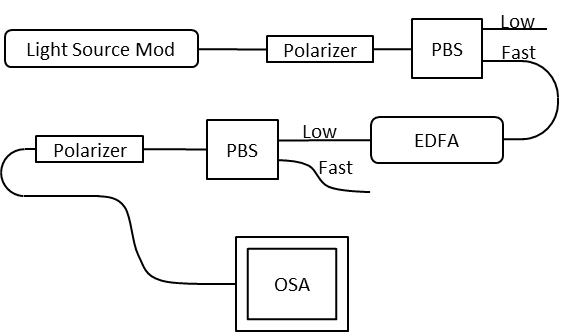
The conventional test method needs to adjust the polarization controller to separate signal light and ASE noise. The value of the ASE noise can be measured after the ASE is separated, but the adjustment of the polarization controller requires a certain amount of time, and the accuracy needs to be increased. Therefore, we propose to use PBS instead of polarization controller to measure ASE. This is a more accurate and efficient test method.

Fig 1 The new measurement of using PBS

The light passing through the fast axis of PBS and entering the EDFA and is amplified in the EDFA. The polarized light amplified by the EDFA will have a specific polarization state, while the ASE generated during the EDFA amplification process is a fully polarized state light. The amplified optical signal can again distinguish the spontaneous emission ASE noise in the EDFA through another arm in the PBS and measure the rest half of the ASE. Test optical path is shown in Figure 1.

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