High-power nonlinearity of optical fiber power meters at 1474 nm

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We have developed a system to measure the nonlinearity of optical fiber power meters (OFPMs) at a maximum power of 0.6 W and minimum power of 2 mW at 1474 nm. The system is based on the triplet superposition method. This system measures nonlinearity of OFPMs using correction factors at different powers; the system is an important tool to characterize OFPMs at high powers. Optical power meter nonlinearity is defined as the relative difference between the response at an arbitrary power and the response at the reference power. The calibration gives the true input power based on the power meter output reading at the calibration point; the measurement of nonlinearity and range discontinuity provides the input-output relationship at any power within the entire dynamic range of the optical power meter.

The triplet superposition method relies on the principle that, for a linear power meter, the sum of meter outputs corresponding to inputs from two individual beams should equal the output when the two beams are combined and incident on the meter at the same time. We will further discuss the triplet superposition method and describe the measurement system depicted in Figure 1. We will present measurement results, which indicate that commercially available OFPMs may demonstrate nonlinear behavior as large as 1.5 % at 1474 nm. To our knowledge, this system is the first linearity system that is designed to calibrate OFPMs in the S-band. This system is used to calibrate OFPMs, which are designed to measure high-optical power in optical fibers.

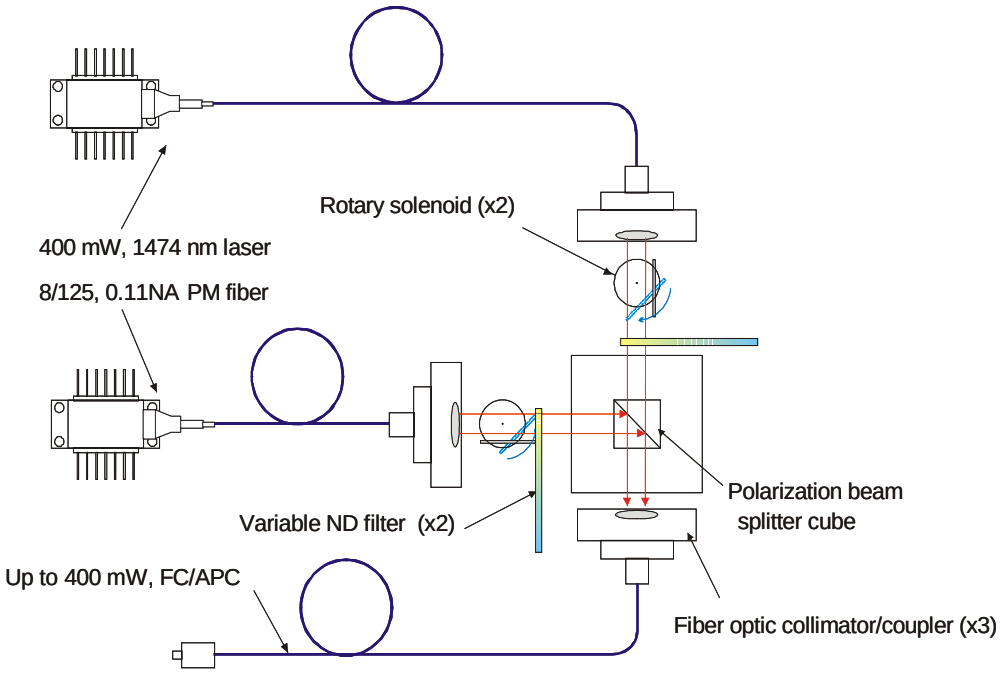

Figure 1. Measurement system.