Characterizing the Statistics of a Bunch of Optical Pulses Using a Nonlinear Optical Loop Mirror

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Abstract.

We propose in this work a technique for determining the amplitude distribution of a wave packet containing a large number of short optical pulses with different amplitudes. The technique takes advantage of the fast response of the optical Kerr effect in a fiber nonlinear optical loop mirror (NOLM). Under some assumptions, the statistics of the pulses can be determined from the energy transfer characteristic of the packet through the NOLM, which can be measured with a low-frequency detection setup. The statistical distribution is retrieved numerically by approximating the solution of a system of nonlinear algebraic equations using the least squares method. The technique is demonstrated numerically in the case of a packet of solitons.