



Passive harmonic mode-locking in a fiber laser with nonlinear polarization rotation

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On basis of numerical simulation and analytical treatment, we investigate the multiple pulse passive mode-locking of a fiber laser with nonlinear loss due to the nonlinear polarization rotation technique. Various additional mechanisms resulting in the ordering of ultrashort pulses inside the laser resonator and in the realization of harmonic passive mode-locking are analyzed. Among which are the active harmonic modulation of the intracavity loss or of the refractive index, the passive modulation of the index due to the inertial properties of intracavity elements, and the amplification modulation due to the depletion and the relaxation of the gain. The velocity of pulses relative to each other is determined, it results in attractive or repulsive pulse-pulse interaction, and allows to evaluate the conditions of ordering of the pulses inside the cavity.

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