

Bright-Dark Pulses in Nonlinear Polarisation Rotation Based Erbium-Doped Fiber Laser

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Abstract : We have experimentally demonstrated bright-dark pulses in a nonlinear polarization rotation (NPR) based mode-locked Erbium-doped fiber laser (EDFL) with a long cavity configuration. Bright-dark pulses could be achieved when the laser works in the passively mode-locking regime and the net group velocity dispersion is quite anomalous. The EDFL starts to generate a bright pulse train with degenerated dark pulse at the mode-locking threshold pump power of 35.09 mW by manipulating the polarization states of the laser oscillation modes using a polarization controller (PC). A split bright-dark pulse is generated when further increasing the pump power up to 37.95 mW. Stable bright pulses with no obvious evidence of a dark pulse can also be generated when further adjusting PC and increasing the pump power up to 52.19 mW. At higher pump power of 54.96 mW, a new form of bright-dark pulse emission was successfully identified with the repetition rate of 29 kHz. The bright and dark pulses have a duration of 795.5 ns and 640 ns, respectively.

Keywords : Erbium-doped fiber laser, nonlinear polarization rotation, bright-dark pulse, photonic

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