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ABSTRACT

Bright-Dark Rogue Wave in Mode-Locked Fibre Laser
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Keywords: Optical rogue wave, Bright-Dark rogue wave, rogue wave, mode-locked fiber laser, polarization instability.

Abstract:
Rogue waves (RWs) are statistically rare localized waves with high amplitude that suddenly appear and disappear in oceans, water tanks, and optical systems [1]. The investigation of these events in optics, optical rogue waves, is of interest for both fundamental research and applied science. Recently, we have shown that the adjustment of the in-cavity birefringence and pump polarization leads to emerge optical RW events [2-4]. Here, we report the first experimental observation of vector bright-dark RWs in an erbium–doped stretched pulse mode-locked fiber laser. The change of induced in-cavity birefringence provides an opportunity to observe RW events at pump power is a little higher than the lasing threshold. Polarization instabilities in the laser cavity result in the coupling between two orthogonal linearly polarized components leading to the emergence of bright-dark RWs. The observed clusters belongs to the class of slow optical RWs because their lifetime is of order of a thousand of laser cavity roundtrip periods.

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