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Octave spanning supercontinuum generation with a few-mode fiber

(Article)

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Abstract

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We propose and demonstrate the generation of a supercontinuum with a few-mode fiber. Due to the accommodation of a few-mode fiber in LP01 and LP11 modes, the system was engineered to detect the octave spanning supercontinuum in both modes. A mode-locked laser with 5.2 nm spectral bandwidth at a central wavelength of 1557 nm, 0.92 ps pulse width, 13.36 MHz repetition rate, and 61.3 dB peak-To-pedestal extinction ratio was implemented with a carbon nanotube saturable absorber. This mode-locked laser was employed as a seed laser for the consecutive generation of supercontinuum with a 500 m few-mode fiber. The laser modes were adjusted with a mode filter to propagate in either LP01 or LP11 modes, which were accessed with a charge-coupled device camera. A fair comparison between a few-mode fiber and a single-mode fiber was made for supercontinuum generation in the LP01 mode. Despite the fact that the few-mode fiber has lower optical power than the single-mode fiber due to higher attenuation, this fiber provides flexible design of laser modes. This work demonstrates the first attempt to generate a supercontinuum with a few-mode fiber, whereby the broad tunable soliton and associated dispersive wave sources for both laser modes were comprehensively studied. © 2020 Astro Ltd.

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