Stable and channel spacing tunable of SOA-based multiwavelength fiber laser utilizing parallel Lyot filter

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Abstract We proposed the generation of a tunable channel-spacing in a multiwavelength fiber laser that incorporates a semiconductor optical amplifier (SOA) and a parallel Lyot filter. Previously, only a few works demonstrated channel spacing tunability using parallel Lyot filter, with none of them utilizing SOA. A stable and tunable multiwavelength spectrum with up to three distinct channel spacings is demonstrated using three different sets of parallel Lyot filter either Short, Long, and Mixed based on varying lengths of polarization-maintaining fiber (PMF). Channel spacing tunability is achieved by selecting different PMF length combinations. Experimental results show that two channel spacing modes, either single or multiple, can be selected for each configuration. Additionally, increasing the SOA drive current results in a greater number of lasing lines with higher intensity within the cavity. The system demonstrates good stability, with peak power differences of 1.46 dB, 0.65 dB, and 2.61 dB for the Short, Long, and Mixed sets, respectively, during a 60-minute observation period.

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