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STUDY OF AN ACTIVE RING TYPE PULSED ERBIUM DOPED FIBER LASER

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In previous work, the behavior of a fiber optic laser with passive modulation was analyzed. This system takes into account the resonance effect generated by the eigen-frequencies of a double linear cavity which produces a temporal modulation [1]. In this work, the emission properties of a pulsed laser Er-doped fiber, with ring cavity type, are analyzed and experimentally corroborated [2-4]. The simple scheme of the laser system includes passive components such as a WDM coupler 980/1550 nm, a coupler 2x2 (90:10) and an optical isolator. In this case, the ring cavity is actively modulated using a Mach-Zehnder modulator driven by a waveform generator. Resonant frequencies were consistent with modulation of the fundamental frequency of the cavity or its harmonics, generating a stable pulse train. Temporal pulse width results dependent of the frequency laser. The repetition rate of the pulse train obtained experimentally varied from 8 to about ~3000 MHz. From the analysis of the dependence between the temporal pulse width and the frequency two exponential decays are observed having different constants. This effect is indicative of different system behaviors in the considered frequency range. This change is generated at approximately 400 MHz. The highest frequency of 2,994 MHz was limited by the wave generator range, while the shorter pulse width (corresponding to the above mentioned frequency) results 58ps.

Keywords: Fiber optic laser; Er-doped fiber; Mode-locking

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