

Evaluation of Tunable Erbium Doped Fiber Ring Lasers for Broadband Applications

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In recent years, tunable laser sources having a wide tuning range, narrow linewidth and stable output power have attracted great attention to be used in many applications such as in dense wavelength division multiplexing (DWDM) network systems, fiber optical sensor systems and testing and characterization of fiber optical components and subsystems. In particular, erbium doped fiber ring lasers (EDFRLs) with a tunable broadband flat spectrum over C and L-bands are preferred due to their advantages of low-intensity noise, high output power and low coupling losses. However, due to their relatively long cavity lengths, they require a careful design to achieve highly stable laser operation with a single longitudinal mode. Several configurations have been proposed in the literature for broadband EDFRLs based on conventional fiber ring laser structure using different types of all-fiber filters. We have also recently presented performance characteristics of stable and widely tunable EDFRLs designed with micro-electro-mechanical system based optical tunable bandpass filter for the conventional EDFA, loop EDFA and double-pass EDFA based configurations. The critical design parameters of the EDFRL such as EDF length, output coupling ratio and pumping level were experimentally investigated to optimize for a tunable in broadband, stable, narrow linewidth laser operation. Tuning ranges of wider than 80 nm covering both C and L bands have been achieved using the proposed EDFRL configurations with a high (~60 dB) OSNR. In this study, we critically analyze the different types of proposed EDFRL structures and compare their performances with the previous presented studies regarding broadband applications.

Keywords—*erbium doped fiber ring laser (EDFRL), erbium doped fiber amplifier (EDFA), wideband tunable laser,*

Biography

Prof. Ahmet ALTUNCU has completed his Ph.D. degree from University of Essex in 1998. He is a full professor at the Department of Electrical and Electronics Engineering in Kütahya Dumlupınar University in Turkey since 1998. He is also the Director of Photonics Technologies Application and Research Center. His research interests are novel erbium doped fiber amplifier designs for broadband optical communication systems, wideband wavelength tunable fiber ring lasers and fiber optical sensor systems. He has published more than 50 international journal and conference papers on fiber optical based communication and sensor system applications.

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