

Phase-Locking of Two Coupled Erbium Doped Fiber Ring Lasers

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The phase-locking effect forced by mutual radiation coupling between lasers was investigated experimentally in two erbium doped ring fibre lasers.

The phase synchronization (phase-locking) of two lasers occurs in generating the same frequency (they can differ only in phase). The phase-locking effect can be forced by mutual radiation coupling between lasers (Fig.1). We investigated experimentally that phenomenon in two erbium doped ring fibre lasers. They were strongly coupled by using a 50/50 fiber coupler. Both lasers had the same resonator lengths in order to keep their free spectral ranges equal. The phase-locking state was diagnosed by observing the spectrum of the beat signals. Using a tuneable fibre Bragg grating, the locking range was investigated. One laser operated at 1551.9 nm, the second one was tuned around. Due to frequency pulling effect, the common wavelength of both synchronized lasers changed from 1551.3 to 1552.2 nm. The locking range was about 225 GHz (1.8 nm). Although the lasers are not single-frequency ones, we showed, that proper designing, careful alignment and phase control can ensure effective phase-locking effect.

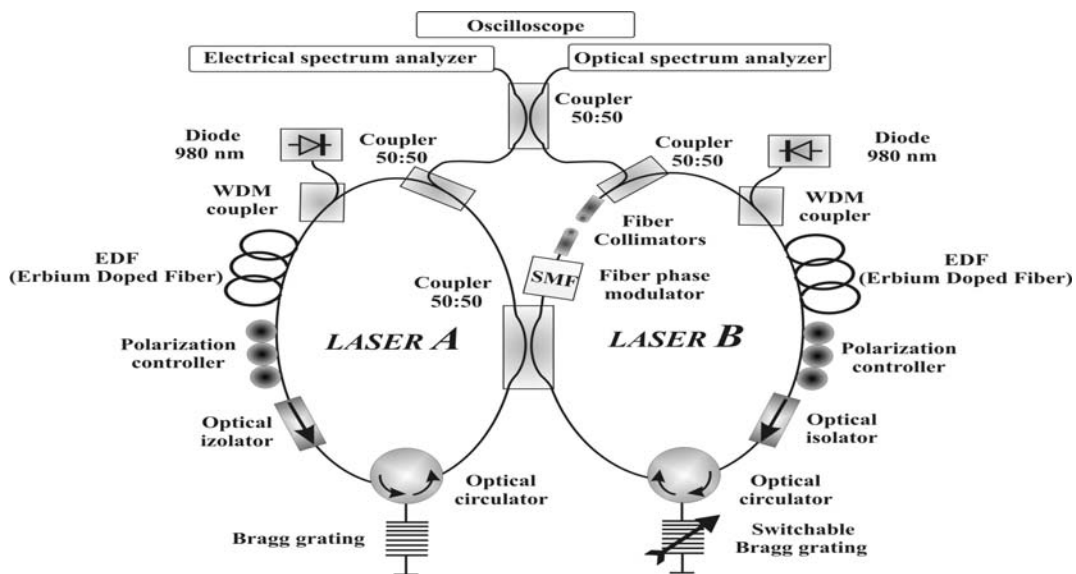


Fig. 1 Two coupled erbium doped fiber ring lasers (EDFLs).

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