

CMT 01 SEMICONDUCTOR RING LASERS TUNED BY EXTERNAL OPTICAL FEEDBACK: THEORY AND EXPERIMENT

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We study theoretically properties of a semiconductor ring laser with filtered delayed optical feedback shown in Figure 1. Sections and junctions of the device are indicated by colored frames and thick black segments, respectively. Here, the frames of different colors indicate different types of the device sections. More particularly, we distinguish the amplifying sections and two types of the passive sections

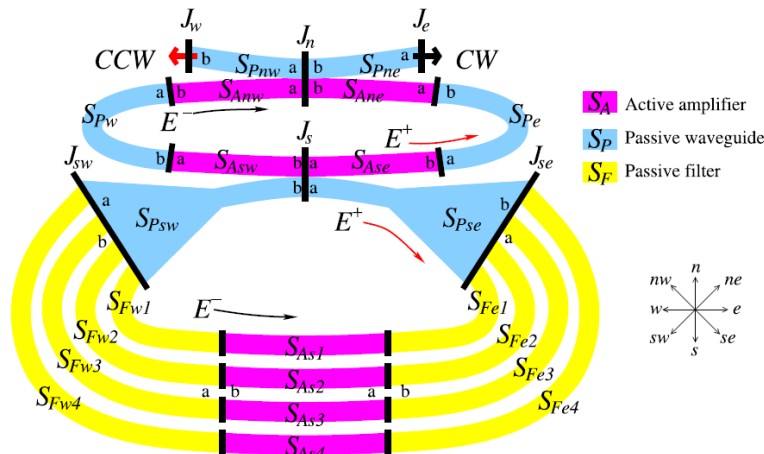


Fig. 1 Schematic representation of the simulated integrated SRL with four branches of filtered and amplified bidirectional optical feedback.

The traveling-wave model [2] determining the evolution of optical fields and carrier density along the ring cavity and filtering branches is used to study the wavelength selection, switching speed and tuning in such devices. This model allows us to study in detail the effect of the different laser parameters and can be useful for designing future devices. Finally, we compare the numerical results with the experimental observations. The results show a good qualitative agreement between measured and calculated characteristics.

[1] RADZIUNAS M., KHODER M., TRONCIU V., DANCKAERT J., AND VERSCHAFFELT G., Semiconductor ring laser with filtered optical feedback: traveling wave description and experimental validation, Journal of the Optical Society of America B, 2018, 35 (2) pp. 380-390.

[2] RADZIUNAS M., “Traveling wave modeling of nonlinear dynamics in multisection laser diodes,” in Handbook of Optoelectronic Device Modeling and Simulation: Lasers, Modulators, Photodetectors, Solar Cells, and Numerical Methods, J. Piprek, ed. (CRC Press, 2017), Vol. 2, pp. 153–182.