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ASPECTS OF CHAOTIC DYNAMICS OF THE SEMICONDUCTOR LASER EMISSION OBTAINED IN DIFFERENT EXTERNAL OPTICAL FEEDBACK CONDITIONS

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Abstract. *We present the dynamic characteristics of the emission of a chaotic laser system working in different optical feedback conditions determined by the use of: injection currents higher than that at threshold, double reflector external cavity or current modulation in an optical coupled master – slave lasers system. We show that stable chaotic low-frequency fluctuations (LFF) were obtained at current values above threshold current only in certain conditions depending on intrinsic properties of semiconductor active region, namely, intensity instabilities of mode-hoping type. By changing the feedback intensities in a double reflector cavity, high frequency chaotic oscillations with tunable frequencies are obtained. They show frequency values bounded by those of external cavities' oscillations formed by the two external reflectors. Also, master current modulation at a frequency included in the range bounded by master and slave natural LFF frequencies has, as effect, the clustering of slave dropouts on two frequencies: driven and master natural LFF ones; if modulation frequency is out of range, it has only the role to group slave dropouts periods on two frequencies, different from the modulation one.*

Keywords: external cavity semiconductor laser, chaotic dynamics, double external feedback, high-frequency oscillations, tunable frequency

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