Optical complexity in external cavity semiconductor laser

ABSTRACT

In this article, the window based complexity and output modulation of a time delayed chaotic semiconductor laser (SL) model has been investigated. The window based optical complexity (OC), is measured by introducing the recurrence sample entropy (SampEn). The analysis has been done without and in the presence of external noise. The significant changes in the dynamics can be observed under induced noise with weak strength. It has also been found that there is a strong positive correlation between the output power and the complexity of the system with various sets of parameters. The laser intensity, as well as the OC can be increased with the incremental noise strength and the associated system parameters. Thus, optical complexity quantifies the system dynamics and its instabilities, since is strongly correlated with the laser outputs. This analysis can be applied to measure the laser instabilities and modulation of output power.