Title: Etude du verrouillage de phase dans les oscillateurs optoélectroniques à fréquences intermédiaires

Abstract:

This thesis investigates the problems of phase locking and mathematical interpretation of mixed-mode oscillations in the optoelectronic system. In the first investigation, we provide a theoretical and experimental analysis of the phase dynamics of optoelectronic oscillator when it is driven by an external voltage in the intermediate frequency range. This configuration leads to phase-locking phenomena that can be theoretically analyzed from the viewpoint of Arnold tongues theory. We determine analytically the range of parameters where the amplitude and the frequency of the driving source induces phase-locking.

Secondly, the analysis of the apparition of mixed-mode oscillations are investigated using the famework based on the Liénard reduction form. We establish that the apparition of mixed-mode oscillations or breathers is linked to the existence of inflection points in the phase space. Our theoretical results are in excellent agreement with experimental measurements.

Keywords : Optoelectronics oscillators, phase-locking, Arnold Tongues, phase space, breather oscillations, nonlinear dynamics, mixed-mode oscillations.

TALLA Alain Françis (08 February 2017)