Subharmonic dynamics of periodic Lugiato–Lefever waves

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Abstract

In this talk, we will consider the liner and nonlinear dynamics of perturbations of spectrally stable periodic stationary solutions of the Lugiato–Lefever equation (LLE), a damped nonlinear Schrodinger equation with forcing that arises in optics. It is known that spectrally stable T-periodic solutions are nonlinearly stable to subharmonic perturbations, i.e. to NT-periodic perturbations for some integer N, with exponential decay rates. However, both the exponential rates of decay and the allowable size of initial perturbations both tend to zero as $N \to \infty$, and hence such subharmonic stability results are not uniform in N and are, in fact, empty in the limit $N = \infty$. The primary goal of this talk is to introduce a methodology, in the context of the LLE, by which a uniform in N stability result for subharmonic perturbations may be achieved (at least at the linear level). The obtained uniform decay rates are shown to agree precisely with the polynomial decay rates of localized, i.e. integrable on the line, perturbations of such spectrally stable periodic solutions of LLE. If time permits, I will also discuss recent progress towards extending these results for the LLE to the nonlinear level. This is joint with with Mariana Haragus (Univ. Bourgogne Franche-Comté), Wesley Perkins (KU) and Bjorn de-Rijk (Stuttgart)

Thanks, and let me know if you have any questions!