Modulational dynamics of spectrally stable Lugiato-Lefever periodic waves

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Abstract

We consider the linear dynamics of spectrally stable periodic stationary solutions of the Lugiato-Lefever equation (LLE). The LLE takes the form of an NLS equation with damping and external forcing, and has been widely studied in nonlinear fiber optics. Our main result establishes the linear asymptotic stability of spectrally stable periodic solutions of the LLE to perturbations which are localized, i.e., integrable on the line. We further show the long-time modulational dynamics are governed by an associated averaged system (known as the Whitham system). Specifically, this work justifies the predictions of Whitham's theory of modulations for the LLE at the level of linear dynamics.

This is joint work with Mariana Haragus (Univ. Bourgogne Franche-Comete) and Wesley Perkins (KU).