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Transverse stability of line soliton for wave guide Schrödinger equations.

The transverse stability has been studied for 2D NLS equations in the spatial cylinder $\mathbb{R} \times \mathbb{T}$. It consists of studying the stability of the standing waves for 1D NLS under the 2D NLS flow.

In this talk, we consider the wave-guide Schrödinger equations

$$i\partial_t\psi + \partial_{xx}\psi - |D_y|\psi + |\psi|^{p-1}\psi = 0, \quad \text{in } \mathbb{R} \times \mathbb{R} \times \mathbb{T},$$

where $1 < p < 5$, $|D_y| := \sqrt{-\partial_{yy}}$ and $\mathbb{T} = \mathbb{R}/2\pi\mathbb{Z}$. This equation was introduced by Xu who showed a modified scattering result.

We will show that the transverse stability depends on the frequencies ω . We will classify the result with respect to a critical frequency ω_p i.e. we will discuss the cases $0 < \omega < \omega_p$, $\omega > \omega_p$ and $\omega = \omega_p$.

This is a joint work with Hiroaki Kikuchi and Slim Ibrahim.