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Positive solutions with prescribed L^2 -norm for a Schrodinger-KdV system.

We will show the existence of solutions with prescribed L^2 -norm in $H^1(\mathbb{R}) \times H^1(\mathbb{R})$ for a couple system of nonlinear Schrödinger-KdV equations. More precisely, we consider the following stationary system

$$\begin{cases} -\Phi'' + \sigma_1\Phi &= \tau|\Phi|^q\Phi + \alpha\Phi\Psi, \\ -\Psi'' + \sigma_2\Psi &= \frac{\lambda}{p+1}\Psi^{p+1} + \frac{\alpha}{2}|\Phi|^2, \end{cases}$$

and look for solutions satisfying

$$\int_{\mathbb{R}} |\Phi|^2 dx = c_1 \text{ and } \int_{\mathbb{R}} |\Psi|^2 dx = c_2,$$

where $c_1 > 0$ and $c_2 > 0$. These types of solutions are of special interest in physics. We also consider the stability issue of the corresponding NLS-KdV solitary waves.

References

J. Albert and S. Bhattarai, Existence and stability of a two-parameter family of solitary waves for an NLS-KdV system, *Adv. Differential Eqs.*, **18**, 1129-1164 (2013). (Received September 05, 2015)