Orbital stability investigation for travelling waves in a nonlinearly supported beam

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We consider the fourth-order wave equation $\varphi_{tt} + \varphi_{xxxx} + f(\varphi) = 0,\ (x,t) \in \mathbb{R} \times \mathbb{R}$ with a nonlinearity f vanishing at 0. Traveling waves $\varphi(x,t) = u(x-ct)$ satisfy the ODE $u'''' + c^2 u'' + f(u) = 0$ on $\mathbb{R}$, and for the case $f(u) = e^u - 1$, the existence of at least 36 solitary travelling waves was proved in [1] by computer assisted means.

We investigate the orbital stability of these solutions via computation of their Morse indices and using results from [2] and [3]. In order to achieve our results we make use of both analytical and computer-assisted techniques.

References

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