Travelling Waves in Asymmetrically Supported Beam

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Abstract

We deal with a nonlinear fourth-order partial differential equation which can be used as a model of an asymmetrically supported beam. To show the existence of travelling wave solutions we use variational approach, in particular the Mountain Pass Theorem together with a nonzero weak convergence after suitable translation. These solutions exist under considerably weakened assumptions than those formerly used in the literature. On the other hand, allowing the presence of sign preserving nonlinearities leads to a limitation of the possible values of the wave speed. Additionally, we also present some forms of classical solutions together with some numerical experiments.