Lower bounds for travelling wave speed in asymmetrically supported beam

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This talk follows the lecture of Hana Levá, i.e., it deals with the same PDE with jumping nonlinearity

$$u_{tt} + u_{xxxx} + au^+ - bu^- + g(u) = 1, \quad x \in \mathbb{R},\ t > 0,$$

describing an asymmetrically supported beam and specifies admissible values of the wave speed c for which the problem possesses a homoclinic travelling wave solution. We show that in contrast to previously studied problems modelling suspension bridges, the presence of the term with negative part of the solution in the equation results in restrictions of c. We provide the maximal wave speed range for which the existence of the travelling wave solution can be proved using the Mountain Pass Theorem. We also introduce its close connection with related Dirichlet and periodic problems and their Fučík spectra. Moreover, we present several analytical approximations of the main existence result with assumptions that are easy to verify.

References

[1] Holubová, G., Levá, H. *Travelling wave solutions of the beam equation with jumping nonlinearity.* Journal of Mathematical Analysis and Applications, 2023, 527.2: 127466.

[2] Holubová, G., Levá, H., Nečesal, P. *Lower bounds for admissible values of the travelling wave speed in asymmetrically supported beam.* Submitted, 2024.