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Travelling waves for the suspended bridge equation

In this talk, we present a computer-assisted technique to prove the existence of travelling waves for the suspended bridge equation for a continuous range of parameter values. The idea is to express the travelling waves as solutions of a boundary value problem (BVP) with the boundary values in the stable and unstable manifolds. The technique uses the parametrization method for invariant manifolds and Chebyshev series, and the BVP is solved in a Banach space of exponentially decaying Chebyshev coefficients. The proof relies on using the uniform contraction principle, with the help of the radii polynomial approach. We will discuss the advantages and the difficulties of our proposed approach. This is joint work with J.B. van den Berg (VU Amsterdam, Netherlands), M. Breden (ENS Cachan, France and Université Laval, Canada) and J.-P. Lessard (Université Laval, Canada).