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Nodal solutions for a class of degenerate BVP's

In this talk we characterize the existence of nodal solutions for a generalized class of one-dimensional diffusive logistic type equations, including

$$-u'' = \lambda u - a(x)u^3, \quad x \in [0, L],$$

under the boundary conditions $u(0) = u(L) = 0$, where λ is regarded as a bifurcation parameter, and the non-negative weight function $a(x)$ vanishes on some subinterval

$$[\alpha, \beta] \subset (0, L)$$

with $\alpha < \beta$.

At a later stage, the general case when $a(x)$ vanishes on finitely many subintervals with the same length is analyzed. Finally, we construct some examples with classical non-degenerate weights, with $a(x) > 0$ for all $x \in [0, L]$, where the BVP has an arbitrarily large number of solutions with one node in $(0, L)$. These are the first examples of this nature constructed in the literature.

References:

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