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Propagation reversal for bistable differential equations on trees

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We study traveling wave solutions to the bistable differential equations on infinite k-ary trees in the form

$$\dot{u}_i = d(ku_{i+1} - (k+1)u_i + u_{i-1}) + g(u_i; a),$$

in which $i \in \mathbb{Z}$, $d > 0$ and $g\colon \mathbb{R} \to \mathbb{R}$ is a bistable nonlinearity of the Nagumo type, e.g.,

$$g(s; a) = s(1-s)(s-a), \quad a \in (0, 1).$$

In this talk, we discuss how comparison principles and construction of explicit lower and upper solution can be used to obtain information about the dependence of the wave speed $c \in \mathbb{R}$ on the parameters a, d, k.

In particular, we show that for certain range of the detuning parameter a the changes to the diffusion parameter d lead to a reversal of the propagation direction.

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