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Dynamics of domain walls in a nonlinear wave equation

We prove that, for well-prepared initial data, solutions of a semilinear wave equation—the hyperbolic analog of the Allen–Cahn equation— exhibit domain walls whose spacetime trajectories form timelike minimal surfaces in Minkowski space. Numerous results of this character have been proved for elliptic and parabolic equations. This result, which as far as we know is the first of its sort for any hyperbolic equation, is relevant to some questions in cosmology that we will desribe briefly, time permitting. Our arguments rely largely on simple variational estimates.

This is joint work with Alberto Montero.