Kink dynamics in the variable-speed $\phi^4$ model

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We consider the $\phi^4$ model, a classical nonlinear equation from quantum field theory, with propagation speeds that are small deviations from a constant function. In the constant-speed case, a stationary solution called the kink is known explicitly, and the recent work of Kowalczyk, Martel, and Muñoz established the asymptotic stability of the kink with respect to odd perturbations in the natural energy space. In this talk, we will discuss the extension of this result to our class of non-constant propagation speeds. We discuss the proof of existence of the stationary solution, the analysis of the linearization around that solution, and the proof of asymptotic stability, which involves adapting the method of Kowalczyk, Martel, and Muñoz from the constant-speed case to the variable-speed case.