

Mathematical Physics

Subsonic phase transition waves in bistable lattice models with small spinodal region

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Phase transition waves in atomic chains with double-well potential play a fundamental role in materials science, but very little is known about their mathematical properties. In particular, the only available results about waves with large amplitudes concern chains with piecewise-quadratic pair potential. In this paper we consider perturbations of a bi-quadratic potential and prove that the corresponding three-parameter family of waves persists as long as the perturbation is small and localised with respect to the strain variable. More precisely, we introduce an anchor-corrector ansatz, characterise the corrector as a fixed point of a nonlinear and nonlocal operator, and show that this operator is contractive in a small ball of a certain function space.

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