Propagation failure in some nonlocal equations

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Abstract

We investigate pinning regions and unpinning asymptotics in nonlocal equations of the form

$$u_t = d(-u + \mathcal{K} * u) + f(u),$$

where $\mathcal{K} * u$ denotes the convolution on the real line. Here, the nonlinearity f is of bistable type and $d > 0$. We show that phenomena are related to but different from pinning in discrete and inhomogeneous media. We establish unpinning asymptotics using geometric singular perturbation theory in several examples. We also present numerical evidence for the dependence of unpinning asymptotics on regularity of the nonlocal convolution kernel. This is joint work with Taylor Anderson, Arnd Scheel and David Stauffer.

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