

Traveling waves for a bistable reaction-diffusion equation with nonlocal-diffusion

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We consider a single component reaction-diffusion equation in one dimension with bistable nonlinearity and a nonlocal space-fractional diffusion operator of Riesz-Feller type. Our main result shows the existence, uniqueness (up to translations) and stability of a traveling wave solution connecting two stable homogeneous steady states. In particular, we provide an extension to classical results on traveling wave solutions involving local diffusion. This extension to evolution equations with Riesz-Feller operators requires several technical steps. These steps are based upon an integral representation for Riesz-Feller operators, a comparison principle, regularity theory for space-fractional diffusion equations, and control of the far-field behavior.