

Layer and stable solutions to a nonlocal model

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We study the layer and stable solutions of the following problem containing a mixture of local and nonlocal terms:

$$-\Delta u + F'(u) (-\Delta)^s F(u) + G'(u) = 0 \text{ in } \mathbb{R}^n$$

where $F \in C_{\text{loc}}^2(\mathbb{R})$ satisfies $F(0) = 0$ and G is a double well potential.

We establish the 1d symmetry of layer solutions for this equation when $n = 2, s > 0$ and $n = 3, s \geq 1/2$. We also obtain the 1d symmetry for stable solutions of this equation when $n = 2$ if F' is bounded away from zero. Such equation can be viewed as a $n - d$ toy model related to a ferromagnetic thin film equation.

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