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Linearized stability of power equilibria of some semilinear parabolic problems: Intervention of the inverse square potential.

The PDE

$$\frac{\partial u}{\partial t} = (-1)^{m+1} \Delta^m u + u^p$$

for $p > 1$, $m \in \mathbb{N}$, $t > 0$, $x \in \mathbb{R}^N$, has positive radial solutions of the form

$$u(x, t) = \varphi(r) = Cr^{-a}; \quad r = |x|, \quad a > 0.$$

The usual forms of the Principle of Linearized Stability/Instability are inadequate to give definitive results for this problem. We discuss improved versions of this criterion, and we discuss the degree of instability of these solutions, which have unexpected dependence on p , m and N . (Received January 27, 2014)