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Infinitely many solutions of semilinear equations on the exterior domains.

We study the steady state reaction diffusion equations

$$\Delta u + K(r)f(u) = 0$$

with various boundary conditions on the exterior of the ball in $\mathbb{R}^N$ such that $\lim_{r\to\infty} u(r) = 0$.

Here, $u(x,t)$ is an unknown spatiotempral vector function, $\Delta u = \text{div } (\nabla u)$ is a laplacian of u with respect to the space parameter x which represents the diffusion term, and $f(u)$ accounts for all reactions and interactions. We assume $f : \mathbb{R} \to \mathbb{R}$ is an odd locally lipschitz non-linear function such that there exists a $\beta > 0$ with $f < 0$ on $(0, \beta)$, $f > 0$ on (β, ∞), and $K(|x|) \sim |x|^{-\alpha}$ for some $\alpha > 0$.

Reaction diffusion system can be interpreted as a mathematical model describing how the concentration of one or more substances vary over time and space under the influence of reaction factor and diffusion factor. (Received September 09, 2019)