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Existence of Many Nonradial Positive Solutions of the Hénon Equation in \mathbf{R}^3

Let B_1 be the open unit ball in \mathbf{R}^3 and let $2 < p < 6$. We show that for each $m \in \mathbf{N}$, there exists $\alpha_0 > 0$ such that for each $\alpha \geq \alpha_0$, there exist at least m nonradial positive solutions of

$$-\Delta u = |x|^\alpha |u(x)|^{p-2} u(x) \quad \text{in } B_1, \quad u = 0 \quad \text{on } \partial B_1,$$

which are mutually nonequivalent if $m \geq 2$.

Keywords: Hénon equation, multiplicity of positive solutions, concentration compactness principle, Poincaré's inequalities.

MSC: 35J20, 35J61