CLASSIFICATION OF FINITE MORSE INDEX SOLUTIONS FOR ROBIN BOUNDARY VALUE PROBLEMS

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ABSTRACT. We study the nonexistence of solution with finite Morse index for the following nonlinear elliptic equation $-\Delta u = |u|^{p-1}u$ in $\mathbb{R}^N_+$, with $\frac{\partial u}{\partial v} + cu = 0$ *on* $\partial\mathbb{R}^N_+$, $p > 1$ and $c > 0$. We call this problem (1).

The purpose of this talk is to show various Liouville-type theorems for smooth solutions under the assumption that they are stable or stable outside a compact set of $\mathbb{R}^N_+$. We give an improvement of X. Zhao and X. Wang (J. Math.Anal.Appl.419(2014)796-803) by removing the assumption that u is bounded. The second main contribution focuses on treating the supercritical case. We first establish the standard integral estimates via stability property to derive the nonexistence results in the subcritical case by mean of the Pohozaev identity. Second, we derive the asymptotic behavior of solutions near infinity. The supercritical case needs more involved analysis, motivated by approach of Farina, we then reduce the nonexistence of nontrivial entire solutions.

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