STABLE WEAK SOLUTIONS OF WEIGHTED NONLINEAR ELLIPTIC EQUATIONS

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Abstract

This paper deals with the weighted nonlinear elliptic equation

$$\begin{cases} -\mathrm{div}(|x|^{\alpha}\nabla u) = |x|^{\gamma}e^{u} & \text{in } \Omega, \\ u = 0 & \text{on } \partial\Omega, \end{cases}$$

where $\alpha, \gamma \in \mathbb{R}$ satisfy $N + \alpha > 2$ and $\gamma - \alpha > -2$, and the domain $\Omega \subset \mathbb{R}^N (N \geq 2)$ is bounded or not. Moreover, when $\alpha \neq 0$, we prove that, for $N + \alpha > 2$, $\gamma - \alpha \leq -2$, the above equation admits no weak solution. We also study Liouville type results for the equation in $\mathbb{R}^N$.

Keywords

stability, weak solution, weighted sobolev space, liouville theorems, exponential nonlinearity.