An obstacle problem with gradient term and asymptotically linear reaction

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Abstract :

We will consider the following obstacle problem

$$\int_\Omega \nabla_u \nabla T_k(v-u)dx + \int_\Omega h(u)\,|\nabla_u|^q\; T_k(v-u)dx \geq \int_\Omega (g(x,u)+f)T_k(v-u)dx$$

with the condition that $u \geq \psi$ a.e in Ω. Under suitable condition relating g,h and q, we show the existence of a solution for all $f \in L^1(\Omega)$.

The main feature is, assuming that g(x,s) is asymptotically linear as $|s| \to \pm\infty$ and independently of the values of

$$\lim_{s\to\pm\infty} \frac{g(x,s)}{s}$$

to obtain a solution for all λ>0 and $f \in L^1(\Omega)$. In this sense we could say that the first order term break down any resonant effect.

Keywords : Nonlinear obstacle problems, existence and nonexistence, regularization, resonance.

Journal Title / Revue : RENDICONTI LINCEI-MATEMATICA E APPLICAZIONI , ISSN : 1120-6330, DOI : 10.4171/RLM/586, Issue : 1, Volume :22, pp. 29-50, 2011.