The p-Laplacian

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Abstract. Consider the following p-Laplacian problem:

$$(P) \quad \begin{cases} -\text{div}(|\nabla u|^{p-2}\nabla u) = f(u) + h(x) & \text{in } \Omega, \\ u = 0 & \text{on } \partial\Omega. \end{cases}$$

where Ω is an open bounded subset of $\mathbb{R}^N$, $N \geq 3$, and let $1 < p < N$. Furthermore, $f : \mathbb{R} \to \mathbb{R}$ is a continuous function such that $|f(t)| \leq a + b|t|^{q-1} \quad \forall t \in \mathbb{R}$, with $a, b > 0$ and $1 \leq q < p$. In this talk we show that, for all $h \in L^{p'}(\Omega)$, where $p' = \frac{p}{p-1}$ there exists a weak solution of the problem (P) by using the method of global minimization of functional energy.

References

[1] Badiale, Marino; Serra, Enrico. *Semilinear Elliptc Equations for Beginners: Existence results via the variational approach.* Universitex. *Springer, London,* 2011. x+199 pp.