PERIODIC PARABOLIC PROBLEMS WITH NONLINEARITIES INDEFINITE IN SIGN

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Abstract

Let $\Omega \subset \mathbb{R}^N$ be a smooth bounded domain. We give sufficient conditions (which are also necessary in many cases) on two nonnegative functions a, b that are possibly discontinuous and unbounded for the existence of nonnegative solutions for semilinear Dirichlet periodic parabolic problems of the form $Lu = \lambda a(x,t) u^p - b(x,t) u^q$ in $\Omega \times \mathbb{R}$, where $0 < p, q < 1$ and $\lambda > 0$. In some cases we also show the existence of solutions u_λ in the interior of the positive cone and that u_λ can be chosen such that $\lambda \to u_\lambda$ is differentiable and increasing. A uniqueness theorem is also given in the case $p \le q$. All results remain valid for the corresponding elliptic problems.