# Periodic solutions for parabolic equations on $R^N$

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**Abstract**

We consider a nonautonomous parabolic equation

$$u_t(x,t) = \Delta u(x,t) + f(t,x,u(x,t)), \qquad x \in R^N,\ t > 0, \tag{1}$$

with continuous and $T$-periodic in time nonlinearity $f : [0,+\infty) \times R^N \times R \to R$. By using a translation along trajectories approach we derive criteria for the existence of $T$-periodic solutions of (1). Here, the translation operator is not compact on bounded sets. Therefore we apply tail estimates to show that it is ultimately compact. This will allow us to compute topological indices of the translation operator and use continuation together with averaging techniques to show that branches of periodic solutions emanate from nontrivial solutions of

$$-\Delta u = \widehat{f}(x,u),$$

where $\widehat{f} : R^N \times R \to R$ is the time-average function of $f$.

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