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Existence and exact multiplicity of positive periodic solutions to forced non-autonomous Duffing type differential equations. (English) Zbl 07444219

Electron. J. Qual. Theory Differ. Equ. 2021, Paper No. 62, 33 p. (2021)

Summary: The paper studies the existence, exact multiplicity, and a structure of the set of positive solutions to the periodic problem

$$u'' = p(t)u + q(t, u)u + f(t); \quad u(0) = u(\omega), \quad u'(0) = u'(\omega),$$

where $p, f \in L([0, \omega])$ and $q: [0, \omega] \times \mathbb{R} \rightarrow \mathbb{R}$ is Carathéodory function. The general results obtained are applied to the forced non-autonomous Duffing equation

$$u'' = p(t)u + h(t)|u|^\lambda \operatorname{sgn} u + f(t),$$

with $\lambda > 1$ and a non-negative $h \in L([0, \omega])$. We allow the coefficient p and the forcing term f to change their signs.

MSC:

[34C25](#) Periodic solutions to ordinary differential equations

[34B18](#) Positive solutions to nonlinear boundary value problems for ordinary differential equations

Cited in **2** Documents

Keywords:

positive periodic solution; second-order differential equation; Duffing equation; existence; uniqueness; multiplicity

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