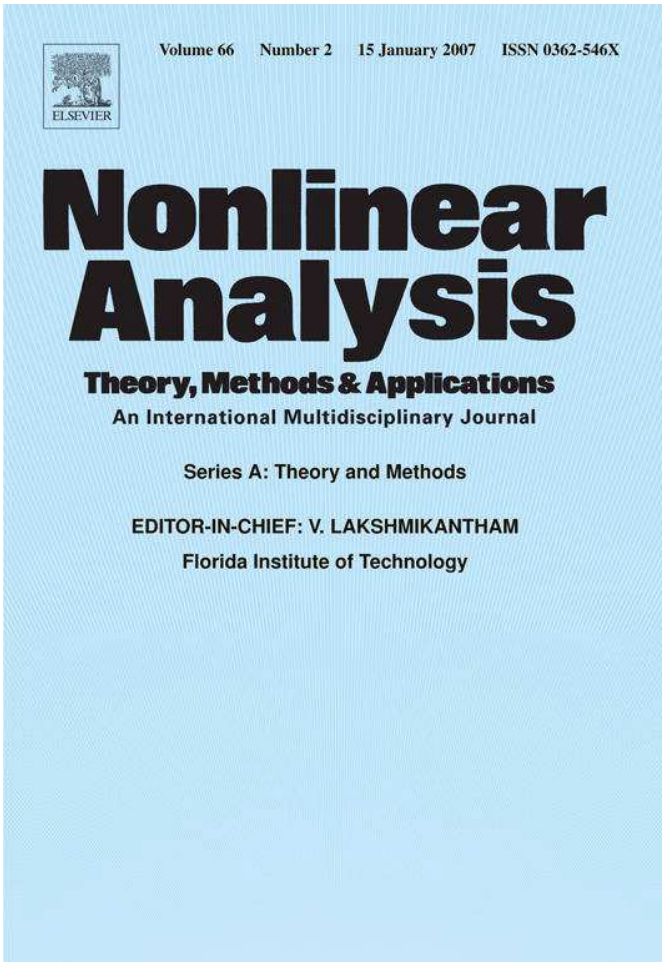

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On a periodic boundary value problem for third order linear functional differential equations

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Abstract

Unimprovable sufficient conditions are established for the unique solvability of the periodic problem

$$u'''(t) = \sum_{i=0}^{2} \ell_i(u^{(i)})(t) + q(t), \quad u^{(j)}(0) = u^{(j)}(\omega) + c_j \quad (j = \overline{0,2}),$$

where $\ell_i : C([0,\omega]) \to L([0,\omega])$ are the linear bounded operators, $q \in L([0,\omega])$ and $c_j \in R$.

MSC: 34K06; 34K10

Keywords: Linear functional differential equation; Periodic boundary value problem; Existence and uniqueness

1. Statement of problem and formulation of main results

Consider the problem of the existence and uniqueness of the solution of the equation

$$u'''(t) = \sum_{i=0}^{2} \ell_i(u^{(i)})(t) + q(t) \quad \text{for } t \in [0,\omega] \tag{1.1}$$

satisfying the periodic boundary conditions

$$u^{(j)}(0) = u^{(j)}(\omega) + c_j \quad (j = \overline{0,2}), \tag{1.2}$$

where $\ell_i : C([0,\omega]) \to L([0,\omega])$ are the linear bounded operators, $q \in L([0,\omega])$, $\omega > 0$, and $c_j \in R$.

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