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Initial function estimation for scalar neutral delay differential equations. (English)

Zbl 1172.34052

Russ. J. Numer. Anal. Math. Model. 23, No. 2, 163-183 (2008).

The paper is concerned with the linear delay differential equation

$$y'(t) = ay(t) + by(t - \tau) + cy'(t - \tau) + f(t), \quad t \in [0, T]$$

subject to the condition $y(t) = \varphi(t)$ for $t \in [-\tau, 0]$. The coefficients $a, b, c \in R$ and $y(t) = y(\varphi, t)$ denotes a solution. The main problem considered here is the identification of an initial function φ_* such that the solution $y(\varphi_*, t)$ approximates the given function \hat{y} . The authors formulate the identification problem in terms of minimization problem of a certain quadratic cost function defined on the specified linear space \mathcal{F} , and next they derive a set of equations defining the minimizer. Finally, an iteration procedure is described which is proved to be convergent to φ_* . The results generalize those presented in the authors' earlier paper [J. Comput. Appl. Math. 181, No. 2, 420-441 (2005; Zbl 1072.65109)] for the simpler case $c = 0$.

Reviewer: [Teresa Regińska \(Warszawa\)](#)

MSC:

- [34K29](#) Inverse problems for functional-differential equations
- [34K28](#) Numerical approximation of solutions of functional-differential equations (MSC2010)
- [34K40](#) Neutral functional-differential equations
- [34K06](#) Linear functional-differential equations

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neutral delay differential equation; inverse problem; initial function; identification problem; iteration method; convergence

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