

Baker, C. T. H.; Parmuzin, E. I.

Identification of the initial function for nonlinear delay differential equations. (English)

Zbl 1088.34067

Russ. J. Numer. Anal. Math. Model. 20, No. 1, 45-66 (2005).

The paper concerns the inverse problem for the nonlinear delay differential equation

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

and $y(t) = \varphi(t)$ for $t \in [-\tau, 0]$, which consists in the identification of an initial function φ , when observed data $\widehat{y}(t)$ are given. The data assimilation problem is formulated as a minimization problem for a suitably introduced discrepancy functional with regularization parameters. For solving this problem, a pseudo-Newton iterative method is presented and the convergence of this method is proved. Finally, the authors present some numerical experiments, where the behavior of the algorithm with respect to different parameters is examined. The results of the paper are an extension of those obtained in the previous papers of the authors [J. Integral Equations Appl. 16, No. 2, 111–135 (2004; Zbl 1080.65121), J. Comput. Appl. Math. 181, No. 2, 420–441 (2005; Zbl 1072.65109)], for the case of linear delay differential equations.

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

MSC:

[34K29](#) Inverse problems for functional-differential equations

[65L09](#) Numerical solution of inverse problems involving ordinary differential equations

[34K28](#) Numerical approximation of solutions of functional-differential equations (MSC2010)

Cited in **3** Documents

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nonlinear delay differential equations; initial function; identification problem; data assimilation; pseudo-Newton method.

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