

Delay Evolution Systems with Nonlocal Initial Conditions

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The purpose of the present work is to study the existence of solutions to semilinear evolution systems with delay subjected to nonlocal initial conditions expressed by continuous nonlinear functionals. We obtain new existence results using the fixed point principles of Perov and Schauder, combined with the technique that uses matrices with the spectral radius less than one and vector-valued norms. This vectorial approach is important while treating systems of equations in general and allows the system nonlinearities to behave independently as much as possible. Moreover, we remark the importance of the constants from the contraction or growth conditions which play an essential role in connection with the support of the nonlocal conditions.

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References

- [1] O. Bolojan-Nica, G. Infante, R. Precup, *Existence results for systems with coupled nonlocal initial conditions*, *Nonlinear Anal.* **94** (2014), 231-242.
- [2] O. Bolojan, G. Infante, R. Precup, *Existence results for systems with nonlinear coupled nonlocal initial conditions*, *Math. Bohemica* **140** (4) (2015), 371-384.
- [3] R. Precup, A. Viorel, *Existence results for systems of nonlinear evolution equations*, *Int. J. Pure Appl. Math.* **47** (2) (2008), 199-206.
- [4] R. Precup, *The role of matrices that are convergent to zero in the study of semilinear operator systems*, *Math. Comp. Modelling* **49** (2009), 703-708.
- [5] I. Vrabie, *C_0 -Semigroups and Applications*, Elsevier, Amsterdam, 2003.