

On Impulsive Differential Equations with Adaptive State-Dependent Delays

Ferenc Hartung

University of Pannonia, Veszprém, Hungary
HARTUNG.FERENC@MIK.UNI-PANNON.HU

Abstract

In this talk we consider a class of impulsive nonlinear differential equations with adaptive state-dependent delays. We discuss the existence and uniqueness of solutions of the initial value problem using a Picard–Lindelöf type argument where we define approximate solutions with the help of equations with piecewise-constant arguments (EPCAs). Moreover, we show that the solutions of the associated EPCAs approximate the solutions of the original impulsive DDE with adaptive state-dependent delay uniformly on compact time intervals. The key assumption underlying both results is that the delayed time function is monotone, or piecewise strictly monotone. We also discuss the problem of differentiability of the solutions with respect to parameters.

References

- [1] F. Hartung. On differentiability of solutions with respect to parameters in impulsive differential equations with adaptive state-dependent delay. *J. Differential Equations*, 413 (2024) 751–804.
- [2] F. Hartung. On existence, uniqueness and numerical approximation of impulsive differential equations with adaptive state-dependent delays using equations with piecewise-constant arguments. *arXiv:2601.01670 [math.DS]*, 2026.