

On Simplicity of Solution Manifolds

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Abstract

Differential equations with state-dependent delays define a semiflow of continuously differentiable solution operators in general only on the associated *solution manifold* $X \subset C^1([-h, 0], \mathbb{R}^n)$. For systems with discrete state-dependent delays we construct a diffeomorphism on a neighbourhood of X which takes X to an open subset of the subspace given by $\phi'(0) = 0$. This is in line with earlier work on the nature of solution manifolds. The present approach, however, is new and dismisses all hypotheses beyond smoothness which have been instrumental so far. Compared to a recent case study it is more direct in the sense that theory of *algebraic delay systems* is avoided.

References

- [1] A direct approach to simplicity of solution manifolds. Preprint, arxiv.org/abs/2601.00642, 21 pp, 2026.