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On solution manifolds

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Joint work with Tibor Krisztin: We show that for a system

$$x'(t) = g(x(t - d_1(Lx_t)), \dots, x(t - d_k(Lx_t)))$$

of n differential equations with k discrete state-dependent delays the associated solution manifold $X_f \subset C^1([-r, 0], \mathbb{R}^n)$, on which the system defines a semiflow of differentiable solution operators, is an almost graph and therby nearly as simple as a graph over the trivial solution manifold X_0 given by $\phi'(0) = 0$. In particular X_f is diffeomorphic to an open subset of the closed subspace X_0. The map L in the system is continuous and linear from $C([-r, 0], \mathbb{R}^n)$ onto a finite-dimensional vectorspace, and g as well as the delay functions d_κ are assumed to be continuously differentiable.

[1] T. KRISZTIN, H.-O. WALTHER, Solution manifolds of differential systems with discrete state-dependent delays are almost graphs, https://doi.org/10.48550/arXiv.2208.06491, preprint (2022)