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*Differential equations with state-dependent delay*

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**Abstract**

We survey recently developed results for a class of delay differential equations including equations with state-dependent delays. The framework of H.-O. Walther allows to show that on a smooth submanifold of a suitable function space the solutions define a smooth semiflow. Linearization, smooth local invariant manifolds can be obtained in this framework. There are nice applications of these results. Nevertheless the theory is not satisfactory. Only  $C^1$  smoothness of the solution operator is known, and many techniques (e.g. in bifurcation theory) require more smoothness. We discuss recent results and problems related to the smoothness.