

Numerical explorations of delay equations: neutral, piecewise-smooth and state-dependent delays

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Through the use of several physical examples, this talk will demonstrate the versatility of numerical continuation and bifurcation analysis tools for investigating different types of delay differential equations. In particular, I will focus on neutral delay equations, piecewise-smooth delay equations and renewal equations with state-dependent delay. A brief introduction to the numerical techniques involved in numerical continuation will be given along with the specific nuances required for delay differential equations. The issue of stability calculations for delay equations will also be addressed. For each of the examples the specific technical challenges and future possibilities will be explored and commonalities between them will be highlighted.