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Frequency-indepedent solvers for linear ODEs

I will discuss a class of solvers for linear scalar ordinary differential equations which run in time bounded independent of frequency. They operate by producing exponential representations of a basis in the space of solutions of the equation. These exponential representations can be used to rapidly evaluate any desired solution of the differential equation at any point in the solution domain with accuracy on the order of the condition number of the problem. I will also present a theorem which bounds the complexity of the exponential representations as a function of a measure of the complexity of the equation's coefficients.

I will discuss applications of this work to the numerical evaluation of special functions and the numerical solution of Sturm-Liouville problems.