

Stability estimates under conditions which are weaker than those in the Kreiss matrix theorem

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In the stability analysis of numerical processes for solving initial value problems, one is often faced with the task of estimating the norm of the n -th power of given matrices. Stable processes are distinguished by the property that moderate upper bounds for these norms exist. The Kreiss matrix theorem gives conditions under which such moderate bounds are valid. One of these conditions is often called the Kreiss resolvent condition.

This talk addresses the issue of whether useful moderate bounds still hold under certain resolvent conditions which are weaker than the original Kreiss condition. Such weaker conditions are encountered in certain applications.

A review is given of various (weak) resolvent conditions and corresponding new moderate bounds, based on recent work by Natalia Borovykh and the speaker. Moreover, an application is presented in the stability analysis of the trapezoidal rule for the numerical solution of delay differential equations.