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Stability of Krylov Subspace Spectral Methods. Preliminary report.

This talk summarizes recent analysis of the stability of an alternative approach to the solution of diffusion problems and wave propagation problems in the variable-coefficient case that leads to a new class of numerical methods, called Krylov subspace spectral methods.

By describing the Fourier components of the computed solution in terms of directional derivatives of moments, we can demonstrate unconditional stability for parabolic problems, given sufficient smoothness of the coefficients of $L(x, D)$. We also discuss generalizations to systems of equations, including a simple high-order scheme for the second-order wave equation. In this case, we demonstrate that Krylov subspace spectral methods, although they are explicit, are not restricted by the CFL condition. (Received February 21, 2007)