Stability of explicit time integration of linear parabolic equations with anisotropic finite element meshes

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Abstract

We study the stability of explicit Runge-Kutta time integration schemes for the linear finite element approximation of linear parabolic equations. The derived bound on the largest permissible time step is tight for any mesh and any diffusion matrix within a factor of at most $2(d + 1)$, where $d$ is the spacial dimension. Both full mass matrix and mass lumping are considered.