A quasi-optimal space-time finite element method for parabolic equations

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We outline the (potential) advantages of simultaneous space-time discretisations of parabolic evolution equations, and illustrate them with some numerical results.

Other than with elliptic equations there is not one obvious variational formulation, and we present several possibilities. They have in common that the bilinear form is not coercive so that one has to resort to minimal residual discretisations, in most cases in a dual norm which leads to a saddle point problem.

For one specific choice of a variational formulation, we present some technical details concerning adaptive mesh refinement, the construction of uniformly bounded Fortin interpolators, and optimal preconditioning.

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