Heat equation as a Friedrichs system

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Joint work with Nenad Antonić and Marko Vrdoljak

Abstract. Symmetric positive systems (Friedrichs systems) of first-order linear partial differential equations were introduced by Kurt Otto Friedrichs (1958) in order to treat the equations that change their type, like the equations modelling transonic fluid flow. It consists of a first order system of partial differential equations (of a specific type) and an *admissible* boundary condition. Friedrichs showed that this class of problems encompasses a wide variety of classical and neoclassical initial and boundary value problems for various linear partial differential equations.

Inspired by recent advances in the theory of Friedrichs, we apply newly developed results to the heat equation, by showing how the intrinsic theory of Ern, Guermond and Caplain (2007) can be used in order to get a well-posedness result for the Dirichlet initial boundary value problem. We also demonstrate the application of the two-field theory with partial coercivity of Ern and Guermond (2008), originally developed for elliptic problems, and also discuss different possibilities for the construction of appropriate boundary operator.

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