Friedrichs' systems

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Abstract:

Friedrichs systems are a class of boundary value problems which allows the study of a wide range of differential equations in a unified framework. They were introduced by K. O. Friedrichs in 1958 in an attempt to treat equations of mixed type (such as the Tricomi equation). The Friedrichs system consists of a first order system of partial differential equations (of specific type) and an *admissible* boundary condition enforced by a matrix-valued boundary field.

In a recent paper: A. Ern, J.-L. Guermond, G. Caplain: *An Intrinsic Criterion for the Bijectivity Of Hilbert Operators Related to Friedrichs' Systems*, *Communications in Partial Differential Equations* **32** (2007) 317–341 a new approach to the theory of Friedrichs systems has been proposed, rewriting them in terms of Hilbert spaces, and a new way of representing the boundary conditions has been introduced. The admissible boundary conditions are characterised by two intrinsic geometric conditions in the graph space, thus avoiding the traces at the boundary.

In this presentation a brief introduction to the classical theory of Friedrich's systems will be given, followed by an overview of main results of the abstract theory. Some new results regarding different representation of boundary conditions in abstract setting will be presented. The relation between the *classical* representation of admissible boundary conditions (via matrix fields on the boundary), and those given by the boundary operator will be addressed as well.