

WELL-POSED QUASI-LINEAR PARABOLIC SYSTEM WITH APPLICATIONS

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Abstract

The purpose of this paper is to present a unified treatment of the Cauchy problem (local and global in time) for various quasi-linear partial differential equations the "parabolic type". (See [T. Kato 1, 2, 3])

The abstract equation of evolution we consider has the form

$$(Q) \quad \frac{du}{dt} + A(t, u)u = f(t, u) \in X, \quad u(0) = \phi \in Y \quad (1)$$

where X and Y are Banach Spaces, $A(t, u)$ is a linear operator from Y into X for each $(t, u) \in [0, T_0] \times W$, W an open subset of Y and $f: [0, T_0] \times W \rightarrow X$.

As a application let's consider a system of two nonlinear reaction-convection-diffusion equations coupled with two ordinary differential equations, with the coupling occurring in both the reaction function and in the differential operator coefficients (see [Mota-Schecter]). The system models the propagation of a combustion front through a porous medium with two parallel layers.

Bibliography

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