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Sokolovská 83, Praha 8 - Karlín

Regularity results for parabolic problems in polygons

We study the regularity of solutions of a linear and a nonlinear parabolic initial boundary value problem in a polygon using the semigroup theory. As a typical linear model problem we consider the heat equation with Neumann boundary conditions, whereas in the nonlinear case nonlinear Newton boundary conditions occur. We start with the linear Neumann problem. The space regularity of the inherent elliptic boundary value problem in polygons is well known. Thus, we choose appropriate function spaces, which reflect the corner singularities. The operator A belonging to the linear boundary value problem is well defined in these spaces. We show that the corresponding operators A are generators of a semigroup. Regularity results in time and space follow. The nonlinear problem is more challenging. At first we consider the inherent boundary value problem with nonlinear Newton conditions. There is a unique weak solution. Taking this into account and exploiting the regularity results for the linear Neumann problem in a polygon, we get regularity results in space, which depend on the corner angles. We show that the corresponding operator A, which is well defined in specific Sobolev spaces, generates a semigroup.

About the speaker

Anna-Margarete Sändig is a specialist for the analysis of Partial Differential Equations in nonsmooth and heterogeneous domains. Moreover, she is working in continuum mechanics with focus on solid mechanics. She has published over 110 research papers in these fields and has given 166 talks at seminars and conferences. She studied at the University of Rostock and at the Moscow State University at the chair of Prof. G. E. Shilov. After her Habilitation in 1981 at the University of Rostock she was working there as a Professor of Analysis. In 1993 she changed to the University of Stuttgart. In 1997/98 she was awarded by the prestigious Sofia Kovalevskaya guest professorship at the University of Kaiserslautern for one year. Moreover, she has got shorter guest professorships in France, Mexico and Austria. Since 2003 she had an extraordinary professorship in Stuttgart. Her relation to Prague has been very close. She cooperated with Prof. A. Kufner, participated in a number of conferences in Prague and has had a long-standing collaboration with Prof. M. Feistauer.

Further information
http://msekce.karlin.mff.cuni.cz/colloquia