Lecture Notes in Mathematics

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Nonlinear Diffusion Problems

Lectures given at the 2nd 1985 Session of
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(C.I.M.E.) held at Montecatini Terme, Italy
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PREFACE

This volume contains the texts of the three series of lectures given at the C.I.M.E. Session on "Some Problems in Nonlinear Diffusion" held at "La Querceta", Montecatini, from June 10 to June 18, 1985.

The general theme of the session was the study of the effects of nonlinearity in diffusion problems. Two main topics were considered: diffusion problems with degeneracy (such as in the porous media equation), and reaction-diffusion problems.

The first topic has been treated in the lectures by prof. Donald G. Aronson (University of Minnesota, Minneapolis). He considered a variety of aspects, ranging from physical background to regularity and asymptotic behaviour of solutions, also including peculiar subjects like waiting times and Hamilton-Jacobi equation.

Mathematical modelling of reaction-diffusion problem with reference to the chemical engineering applications has been illustrated by prof. Ivar Stakgold (University of Delaware, Newark). Various types of approximations have been discussed and the corresponding mathematical aspects have been investigated devoting special attention to the possible formation of dead cores.

Steady state processes in reaction-diffusion have been the main subject of the lectures by prof. Jesus Hernandez (Universidad Autonoma, Madrid). His large overview of qualitative methods covers in particular comparison arguments, the stability of solutions, and the use of topological degree theory.

The volume is complemented by a seminar on "rearrangements of functions and partial differential equations" which was presented by prof. Giorgio Talenti (Università di Firenze).

We wish to thank the lecturers and the participants, as well as the CIME scientific committee. We feel that the Session was quite successful for the interest shown by the audience and the extremely high quality of the lectures delivered.

A. Fasano

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