Proceedings of EQUADIFF 2017 Conference

Editors:

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Preface

The Equadiff is a series of biannual conferences on mathematical analysis, numerical approximation and applications of differential equations. It is held in rotation in the Czech Republic, Slovakia and Western Europe. The last Equadiff (Equadiff 14 in the Czecho-Slovak series) was organized in Bratislava, Slovakia, July 24-28, 2017 by the Slovak University of Technology, in cooperation with Comenius University, Union of Slovak Mathematicians and Physicists, Slovak Mathematical Society and Algoritmy:SK, ltd.

During the last decades the Equadiff has clearly developed into the world platform for international exchange of ideas on all mathematical and numerical aspects of differential equations, ranging from fundamental concepts to applications.

The scientific program of Equadiff 2017 Conference was proposed and prepared by the members International Scientific Programme Committee: Michal Beneš (Czech Technical University, Prague, Czech Republic), Charlie Elliott (University of Warwick, UK), Eduard Feireisl (Czech Academy of Sciences, Prague, Czech Republic), Marek Fila (Comenius University, Bratislava, Slovakia), Raphaele Herbin (University of Aix-Marseille, France), Grzegorz Karch (University of Wroclaw, Poland), Karol Mikula (Slovak University of Technology, Bratislava, Slovakia), Masayasu Mimura (Meiji University, Tokyo, Japan), Mario Ohlberger (University of Münster, Germany), Peter Poláčik (University of Minnesota, Minneapolis, USA), Otmar Scherzer (University of Vienna, Austria), Pavol Quittner (Comenius University, Bratislava, Slovakia), Eiji Yanagida (Tokyo Institute of Technology, Japan). Organizing Committee of the conference consisted of Peter Frolkovič, Angela Handlovičová, Martin Kalina, Karol Mikula, Daniel Ševčovič, Róbert Špir and Peter Struk. The conference was chaired by Karol Mikula and co-chaired by Marek Fila.

Proceedings of Equadiff 2017 Conference contain peer-reviewed contributions of participants of the conference. The proceedings cover a wide range of topics presented by plenary, minisymposia and contributed talks speakers. The scope of papers ranges from ordinary differential equations, differential inclusions and dynamical systems towards qualitative and numerical analysis of partial differential equations, stochastic PDEs and their applications.

In several papers, the authors studied qualitative and numerical properties of solutions to cross-diffusion systems with entropy structure, boundedness and stabilization of solutions in a three-dimensional and two-species chemotaxis-Navier-Stokes system, boundedness of solutions in a fully parabolic chemotaxis system with signal-dependent sensitivity and logistic term. Several authors studied well-posedness of solutions for a mass conserved Allen-Cahn equation with a nonlinear diffusion term, the porous medium equations and nonlinear cross-diffusion systems and efficient linear numerical scheme for solving the Stefan problem.

The authors also investigated qualitative behavior of solutions of the undamped Klein-Gordon equation and entropy of the attractor of the strongly damped wave equation. The conference proceedings contain papers on dynamical models of viscoplasticity and Lyapunov stability in hypoplasticity models. The proceedings further include papers dealing with qualitative properties of solutions for systems of fractional boundary value problems and analysis of inequalities with gradient nonlinearities and fractional Laplacian operators. The proceedings also contain papers dealing with qualitative properties like uniqueness and regularity of solutions for systems of coupled elliptic and parabolic equations.

Several papers are devoted to the numerical analysis of finite element and discrete Galerkin methods for elliptic problems with nonlinear boundary conditions. Applications of theoretical results cover viral infection modelling with diffusion and state-dependent delay, an analysis of a model of suspension flowing down an inclined plane as well as applications of tree-grid and finite stencil numerical methods in computational finance, optimal control and optimal design. Interesting applications of partial differential equations in image segmentation and computational differential geometry can be also found in the proceedings.

We thank all the authors for their interesting contributions to the conference proceedings. We also thank our reviewers for their valuable comments and suggestions which improved quality of presentation of results.

Bratislava, November 30, 2017

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