PhD research topic proposal

BME, Doctoral School of Mathematics and Computer Science

Name of supervisor :

Dr. Róbert Horváth

Degree:

PhD

Title of the topic:

Qualitative investigation of the numerical solutions of partial differential equations

Short description:

Partial differential equations frequently serve as mathematical models of real-life phenomena (e.g. in the case of physical, chemical, biological and economic processes). It is important that the approximate solutions obtained with numerical techniques should possess the characteristic qualitative properties of the original phenomenon. This requirement generally gives some restrictions for the adequate discretization of the problem. The goal of the research is to investigate the qualitative properties of linear and nonlinear parabolic partial differential equations. Sufficient conditions are to be deduced for the model parameters, for the discrete mesh structures and for the time step that guarantee the validity of the qualitative properties. The research can be extended to the mathematical models of processes that are closer to the interest of the applicant. The theoretical results are to be verified on numerical test problems

Requirements:

Standard courses on partial differential equations and on their numerical solutions, programming skills in Matlab.

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Place of work:

Department of Analysis, Institute of Mathematics, BME

Statement: *The conditions of the research above are satisfied, the theme is confirmed by the Head of the Department/Institute*