Workshop dedicated to the memory of Professor Gabriela Kohr
Geometric Function Theory in Several Complex Variables and Complex Banach Spaces

Cluj-Napoca, Romania   1 – 3 December 2021

Layer and volume potentials of the Stokes system with non-smooth anisotropic viscosity tensor and some applications

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Abstract

The first aim of this research is to develop a volume and layer potential theory in L_2-based weighted Sobolev spaces on Lipschitz bounded and exterior domains of $\mathbb{R}^n$, $n \geq 3$, for the anisotropic Stokes system with L_∞ viscosity coefficient tensor satisfying an ellipticity condition for symmetric matrices. To do this, we explore equivalent mixed variational formulations and prove the well-posedness of some transmission problems for the anisotropic Stokes system in Lipschitz domains in weighted Sobolev spaces. These results are used to define the Newtonian and layer potentials and to obtain their properties. Then we analyze well-posedness of the exterior Dirichlet, Neumann and mixed problems for the Stokes system with L_∞ elliptic coefficient tensor satisfying a relaxed ellipticity condition. Finally, we prove the existence of a solution for a transmission problem in complementary Lipschitz domains in $\mathbb{R}^3$ for the anisotropic Navier-Stokes system with data in L_2-based weighted Sobolev spaces. The analysis relies on an existence result for a Dirichlet-transmission problem for the anisotropic Navier-Stokes system in a family of bounded domains, and on the Leray-Schauder fixed point theorem.

Presentation is based on the results obtained in collaboration with M. Kohr (Cluj-Napoca, Romania) and W.L.Wendland (Stuttgart, Germany) and published in the paper:

M. Kohr, S.E. Mikhailov, W.L. Wendland, Layer potential theory for the anisotropic Stokes system with variable L_∞ symmetrically elliptic tensor coefficient. *Math. Meth. Appl. Sci.*, **44** (2021), 9641–9674.