

A. L. HULIANYTSKYI

Weak Solvability and Galerkin Discretization of a Variable-order Diffusion Equation

*Taras Shevchenko National University of Kyiv, Ukraine
E-mail: andriyhul@gmail.com*

Consider the initial-value problem

$$\frac{\partial u(x, t)}{\partial t} - \Delta(K(x)D_0^{1-\alpha(x)}u(x, t)) = f(x, t), \quad (1)$$

$$u|_{t=0} = u_0(x), u|_{\partial\Omega} = 0, \quad (2)$$

where $\Omega \subset \mathbb{R}^n$, $n \in \mathbb{N}$, is a bounded domain with a smooth boundary $\partial\Omega$, $D_0^{1-\alpha(x)}$ is the Riemann-Liouville fractional derivative of order $1 - \alpha(x)$ with respect to t with lower bound 0, and Δ stands for the Laplace operator with respect to x .

Equations of the form (1) and their generalizations have recently been suggested as mathematical models of anomalous diffusion in inhomogeneous media. They could possibly be applied to studying intracellular transport.

In the talk, weak solvability of (1)-(2) will be discussed. Also, a numerical method based on the space-time discretization of (1) will be presented.