

*Vladimir Gotsulenko* (Zhelyte Vody Business Institute Strategiya, 38 Gagarin Str., Zhelyte Vody, 52201, Ukraine)

## **Suboptimal boundary control of Benard problems in cylindrically perforated domains**

The thesis deals with the boundary velocity suboptimal control of incompressible flow in cylindrical perforated domains [1] (in the so-called generalized Kuett cell). It is supposed that the mathematical model of above control object is the non-linear Bernard system.

The control is the boundary velocity field supported on the "vertical" sides of thin cylinders. The cost functional corresponds the vorticity of viscous flow through thick perforated domain.

Following the concept of variational convergence of constrained minimization problems, the structure of suboptimal controls is obtained. It is shown that the suboptimal control for the original object can be taken as optimal one to the limit problem in non-perforated domain. However, the structure of this limit problem essentially depend on the geometrical properties of the perforation type. Namely, the limit problem, and hence the suboptimal control, make take the form either a variational calculation problem or an optimal control problem for Bernard - Brinkman law with another cost functional and another control type and control constraints.

It is shown that under some additional conditions there is a sense to consider the original problem in non- steady - state statement.

- [1] Gotsulenko V.V. Boundary control of a laminar flow of a viscous incompressible fluid in the generalized Couette cell. The asymptotic approach /V.V. Gotsulenko, P.I. Kogut // Automation and Remote Control. - 2007. -V. 68, No 2. -P. 267-283.
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