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# FLUID CONVECTIVE FLOWS SIMULATION IN ENCUMBERED SPACE

**Abstract**

The problem of fluid flows in essentially encumbered space are relevant to fluid flows in heat exchangers of different types, wherein flow channels are blocked up by different heat exchange elements. The present investigation is also relevant to studying the thermal fields established inside the spacecraft capsule under the flight conditions. The great amount of the containers and complexity of the fluid-solid body interface is the main difficulty for the model elaboration. The traditional approach requires the calculation of fluid flow in a space of very complex form shaped containers and the boundary conditions should be formulated along the whole fluid-solid body interface. To avoid this difficulty an original approach has been worked out performing calculation. The fluid flow in the capsule was simulated using the model for fluid filtration in porous medium of changeable permeability. The mathematical model of fluid filtration through the medium with variable permeability is more suitable for the numerical calculations as it does not need the formulation of great amount of boundary conditions at the container surfaces and the calculation of flow in the space of a rather complex form between the containers. To avoid these difficulties, it is enough to determine the medium in the containers as a low permeable and the medium between them as high permeable. Essentially different temperatures in fluid bring to viscosity variation, which in case of forced convection definitely present under microgravity conditions creates the situation of viscous fluid displacement by a less viscous one. The support of Russian Foundation for basic research is gratefully acknowledged (project 09-08-12131).