Numerical modeling of a honeycomb head for a regenerator used in microcryogenic gas systems

© V.V. Kulik, E.S. Navasardyan, A.N. Parkin

Bauman Moscow State Technical University, Moscow, 105005, Russia

We employed numerical analysis methods to assess time between failures for microcryogenic gas systems at the design stage, taking into account various factors, including structural parameters. We suggest using multi-factor heat, gas and fluid dynamics analysis, based on integration of accumulated experience in experimental investigations and numerical modelling. We provide an example of applying this multi-factor heat, gas and heat dynamics analysis to analysing units of microcryogenic gas systems. We conducted three-dimensional numerical modelling of structure and fluid dynamics in a honeycomb regenerator as the primary risk-accumulating unit. We compared the results of numerically investigating the drag in the regenerator we modelled as a function of the Reynolds number to the results of computations based on foreign researchers' correlation dependences, which showed a high degree of convergence with Tanaka's and Blase's dependencies. This comparison forms the basis for using the model supplied in the mathematical model for further computations.

Keywords: *microcryogenic gas system, honeycomb head, regenerator, regenerative heat exchanger, multi-factor analysis in heat gas and fluid dynamics, mathematical modelling, friction factor, hydraulic resistance*

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Kulik V.V., post-graduate student, Department of Refrigeration, Cryogenic Engineering, Air Conditioning and Life Support Systems, Bauman Moscow State Technical University. Specialises in developing mathematical models for fluid dynamics and heat and mass transfer processes in cryogenic plants, investigating non-steady heat transfer processes in microcryogenic gas system assemblies.
e-mail: vikakulik687@gmail.com

Navasardyan E.S., Cand. Sc. (Eng.), Assoc. Professor, Department of Refrigeration, Cryogenic Engineering, Air Conditioning and Life Support Systems, Bauman Moscow State Technical University. Specialises in heat and mass transfer in cryogenic assemblies, gas and gas mixture liquefaction and separation technology, developing honeycomb structures for regenerative heat exchangers employing contemporary 3D modelling methods. e-mail: navasard@mail.ru

Parkin A.N., Senior Lecturer, Department of Refrigeration, Cryogenic Engineering, Air Conditioning and Life Support Systems, Bauman Moscow State Technical University. Specialises in heat and mass transfer in cryogenic assemblies, gas and gas mixture liquefaction and separation technology, modelling gas and fluid dynamics and heat and mass transfer processes in low-temperature heat exchangers. e-mail: parkin.aleksey@list.ru