Features of convective heat transfer in heated helium channel flow

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The aim of the present work is to choose an optimal method for thermohydraulic calculation of the gas flow in channels with intense heating at the flow Reynolds number below 10,000. These conditions are typical of the cooling channels of the High-Flux-Test Module of the International-Fusion-Materials-Irradiation-Facility (IFMIF/HFTM). A low Reynolds number and a high heating rate can result in partial relaminarization of the initially turbulent flow, and hence in a decrease in the heat transfer. A number of turbulence models offered by the commercial STAR-CD code were tested on the basis of the comparison of the numerical predictions with experimental data. This comparison showed that the low-Reynolds-number *k*? *?* turbulence models predict the heat transfer characteristics close to the experimental data. The *k?? *linear low Reynolds number turbulence model of Lien was applied as more appropriate for the thermohydraulic analysis of the IFMIF high flux test module.

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