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External heat transfer in corridor and staggered tube bundles of different configuration under the application of low-frequency pulsations

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Abstract

© Published under licence by IOP Publishing Ltd. In this paper, the external heat transfer coefficient for cross flow around a tube bundle by a pulsating flow was studied by numerical method. ANSYS Fluent 14.0 program is used for the mathematical modeling. The Reynolds numbers lie in the range 100 ≤ Re ≤ 1000, the Prandtl numbers 215 ≤ Pr ≤ 363, the frequency and the dimensionless relative amplitude of the pulsations were in the range 0,2 ≤ f ≤ 0,5, Hz, 15 ≤ β ≤ 35, the pulsation ratio 0,25 ≤ ψ ≤ 0,5. The external heat transfer for low-frequency pulsations was studied for 9 configurations of staggered tube bundles and 3 corridor tube bundles. Based on the modeling results, a criteria equation is obtained that allows calculating the external heat transfer in pulsating flows in tube bundles of different configurations. It is established that an increase in Re, Pr, ψ leads to a decrease in heat transfer, and an increase in f and β to an increase in heat transfer.

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