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Numerical simulation of heat transfer and hydrodynamics ring and V-shaped heat exchange intensifiers

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Abstract

© 2016, International Journal of Pharmacy and Technology. All rights reserved. An urgent task is the increase of thermal efficiency of pipes for heat exchangers. The greater efficiency of the pipes, the more compact heat exchangers can be created; its material consumption and cost will also reduce. The most common method is increasing the efficiency by applying surface heat exchange intensifiers. It is important to keep in mind that increasing the thermal efficiency by applying heat exchange intensifiers entails an increase of the hydraulic resistance of pipes. To create an effective intensifier we need to find the balance between the thermal efficiency growth and the hydraulic resistance growth. The results of numerical simulation of the process of heat transfer using a new kind of v-shaped intensifiers are presented in the work. A comparison of the thermal efficiency of v-shaped intensifiers with ring intensifiers and smooth pipes, and the comparison of the hydraulic resistance increase are given in the article. The research of hydrodynamic and heat exchange processes was carried out in turbulent regime within the range of Re numbers from 3000 to 40000 to assess the thermal-hydraulic efficiency of pipes in various flow regimes. The application of v-shaped intensifiers can improve thermal efficiency in the whole range of studies compared with ring intensifiers, at moderate growth of hydraulic resistance at low value of Re numbers.

Keywords

Engineering, Flow structure, Heat transfer, Intensifier, Modeling, Simulation, Turbulence flow