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Investigation of thermohydraulic characteristics of a novel triple concentric pipe minichannel heat exchanger

Abstract:

With the high-speed development of the economy and society, energy demand in the modern world has risen rapidly. At the same time, the issue of energy consumption also has a growing impact on the environment in which we live. Therefore, how to improve energy efficiency is of great significance for alleviating energy consumption and improving the environment. As an energy-saving device, the heat exchanger can realize the transportation of heat between two or more fluids with different temperatures. And they have been widely applied in various industrial and engineering applications. In the present study, a novel triple concentric pipe minichannel heat exchanger (TCPMHE) with a countercurrent pattern is presented and built, which is a combination of the triple concentric pipe heat exchanger and minichannel heat transfer technology. Experimental investigations are conducted by varying volume flow rate of hot water, inner annulus size and hot fluid inlet temperature, aiming to explore the effects of all these factors on the Nusselt number (Nu), Darcy friction factor (f), effectiveness (ϵ) of the novel TCPMHE. Moreover, the comparison and analysis of the thermohydraulic performance are made between double concentric pipe minichannel heat exchanger (DCPMHE) and TCPMHE. The findings are conducive to better understanding the thermohydraulic characteristics of the novel TCPMHE, which also provide some references for the novel TCPMHE in future industrial applications.

Biography

Haojie Li has completed his PhD at the age of 32 years from Tianjin University. He is mainly engaged in the basic research and application development of multiphase process intensification technology in the fields of energy, chemical industry and environment. He has published more than 15 papers in reputed journals and has been granted 2 Chinese invention patents.