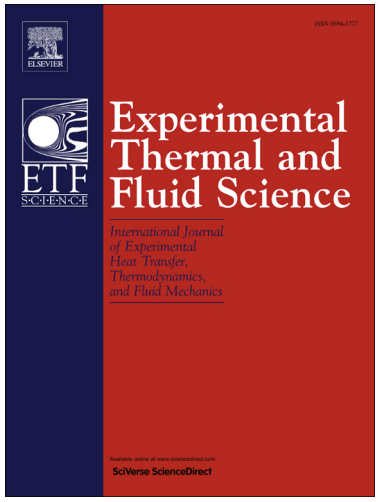

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Effect of turbulence intensity on the pressure drop and heat transfer in a staggered tube bundle heat exchanger

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Abstract

This paper investigates experimentally the correlation and the effect of the turbulence intensity on the pressure drop and the heat transfer mechanism of a heat exchanger with elliptic tubes in a staggered arrangement. The heat exchanger studied in this work is an air-water cross flow heat exchanger with air being the external fluid and water the internal one. The heat exchanger consists of 144 elliptic tubes placed in a staggered arrangement. The experiments were carried out for two setups. The first setup was referring to isothermal conditions for which only air was used, flowing around the tubes. The second setup was referring to non-isothermal conditions with air as the external fluid and water as the internal working fluid, flowing inside the tubes. The Reynolds number for the external air for the isothermal experiments ranged between 3100 and 5200 based on the maximum velocity between the elliptic tubes. The turbulence intensity values varied between 0.9% and 3%. For the non-isothermal measurements the Reynolds number took values from 3100 to 7700 and the turbulent intensity ranged from 0.9% to 3%. The measurements showed that the