

Air Flow Characteristics and Pressure Distributions for Staggered Wing Shaped Tubes Bundle

Authors : Sayed A. Elsayed, Emad Z. Ibrahim, Osama M. Mesalhy, Mohamed A. Abdelatif

Abstract : An experimental and numerical study has been conducted to clarify fluid flow characteristics and pressure drop distributions of a cross-flow heat exchanger employing staggered wing-shaped tubes at different angles of attack. The water-side Re_w and the air-side Re_a were at 5×10^2 and at from 1.8×10^3 to 9.7×10^3 , respectively. Three cases of the tubes arrangements with various angles of attack, row angles of attack and 90° cone angles were employed at the considered Re_a range. Correlation of pressure drop coefficient P_{dc} in terms of Re_a, design parameters for the studied cases were presented. The flow pattern around the staggered wing-shaped tubes bundle were predicted by using commercial CFD FLUENT 6.3.26 software package. Results indicated that the values of P_{dc} were increased by increasing the angle of attack from 0° to 45° , while the opposite was true for angles of attack from 135° to 180° . Comparisons between the experimental and numerical results of the present study and those, previously, obtained for similar available studies showed good agreements.

Keywords : wing-shaped tubes, cross-flow cooling, staggered arrangement, CFD

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020