

Performance Study of Scraped Surface Heat Exchanger with Helical Ribbons

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Abstract : In this work, numerical simulations were carried out using a specific CFD code in order to study the performance of an innovative Scraped Surface Heat Exchanger (SSHE) with helical ribbons for Bingham fluids (threshold fluids). The resolution of three-dimensional form of the conservation equations (continuity, momentum and energy equations) was carried out basing on the finite volume method (FVM). After studying the effect of dimensionless numbers (axial Reynolds, rotational Reynolds and Oldroyd numbers) on the hydrodynamic and thermal behaviors within SSHE, a parametric study was developed, by varying the width of the helical ribbon, the clearance between the stator wall and the tip of the ribbon and the number of turns of the helical ribbon, in order to improve the heat transfer inside the exchanger. The effect of these geometrical numbers on the hydrodynamic and thermal behaviors was discussed.

Keywords : heat transfer, helical ribbons, hydrodynamic behavior, parametric study, SSHE, thermal behavior

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