عنوان مقاله:

Numerical Analysis of the 3D Cross Flow between CorrugatedParallel Plates

محل انتشار:

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خلاصه مقاله:

The 3D cross flow between parallel corrugated plated with intersecting directions of corrugation is numerically modeled as a laminar, incompressible, steady flow. In order to solve the governing equations of flow, an analytical mathematical transformation is used to transform the complicated physical domain to a cubic computational one. It is tried to minimize the minimum gap between the wavy plates up to 5% of' wavelength. The FDM discretiZ1ltion along with Chorin's artificial compressibility method is used to solve the governing equations and results are presented as streamlines and friction factor. Investigations result that if the amplitude to wavelength ratio increases, the friction factor growes with regards to Reynolds number. The increase in pressure drop of wavy plates regarding to flat plate situation is up to 450% compared to flat plates in investigated range of Reynolds numbers. Streamlines at various Reynolds numbers show that fluid particles in upper and lower 'waves, tend to move in a helical path and swirl along the waves corridors, but the particles which are positioned in the gap between upper and lower waves move diagonally across the wavy plates. They also obey a helical pattern but the size of these helical patterns decrease when Reynolds number increase. Streamlines in upper and lower waves, which are near the gap between the plates, at low Reynolds numbers move helically across the domain but when Reynolds number increases, they tend to move along the wave directions. Keywords: corrugated plates, wavy, friction factor, pressure drop

کلمات کلیدی:

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