

Numerical Investigation of the Effect of Number of Waves on Heat Transfer in a Wavy Wall Enclosure

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Abstract : In this paper the effect of wall waviness of side walls in a two-dimensional wavy enclosure is numerically investigated. Two vertical wavy walls and straight top wall are kept isothermal and the bottom wall temperature is higher and spatially varying with cosinusoidal temperature distribution. A computational code based on Finite-volume approach is used to solve governing equations and SIMPLE method is used for pressure velocity coupling. Test is performed for several different numbers of undulations. The Prandtl number was kept constant and the Ra number denotes that the flow is laminar. Temperature and velocity fields are determined. Therefore, according to the obtained results a correlation is proposed for average Nusselt number as a function of number of side wall waves. The results indicate that the Nusselt number is highly affected by number of waves and increasing it decreases the wavy walls Nusselt number; although the Nusselt number is not highly affected by surface waviness when the number of undulations is below one.

Keywords : cavity, natural convection, Nusselt number, wavy wall

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