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Conjugate heat transfer analysis of multi-harmonic micro-wavy channels[1] JUSTIN MOON, ARTURO PACHECO-VEGA, California State University - Los Angeles, J. RAFAEL PACHECO, SAP Americas — In this study, numerical simulations are performed to investigate the conjugate heat transfer in three-dimensional multi-harmonic microscale wavy channels. The focus here is on the analysis of the channel surface-topography, modeled as a sinusoidal wave of square cross-sectional area, through which cold water flows within the laminar regime, and its influence on the enhancing mechanisms. A device of length of 20 mm, 16 mm of which are of sinusoidal shape, with 2 mm straight sections at the channel inlet and outlet, is used as baseline for comparison purposes. The channel is enclosed by a solid rectangular prism block, on which heat flux of 47 W/cm^2 acts at the bottom surface within the sinusoidal region. Using the performance factor (PF); i.e., the ratio of the Nusselt number to the pressure drop, as objective function, a parametric analysis is carried out for a set of inlet velocities (Re=50, 100 and 150), the investigate whether (and how) the addition of harmonic-waves for the channel geometry enhances the value of the PF when compared to a single-wave device.

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