#### Abstract

The present paper addresses the numerical study of non-Darcy laminar forced convectionflows in a pipe partially filled with grooved metallic foam attached in the inner pipe wall,which is subjected to a constant heat flux. Computations are carried out for nine differentdimensions of grooves with different Reynolds numbers namely; (250 ≤ Re ≤ 2000) andtheir influences on the fluid flow and heat transfer are discussed. The governing and energyequations are solved using the finite volume method (FVM) with temperature-dependentwater properties. The novelty of this work is developing of a new design for the metallicfoam, which has not studied previously yet. It is observed that the two helical grooves withtwo pitches increase the Nu around 5.23% and decrease the pumping power nearly 12%. Itis also showed a reduction in the amount of material required for manufacturing the heatexchanger, which leads to a decline in the weight of the system 8.29%.