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**Effects of Adding Nanoparticles on Boiling and Condensing Heat Transfer inside a horizontal round tube** MOHSEN SHEIK-HOLESLAMI, Department of Mechanical Engineering, Babol University of Technology, Babol, Islamic Republic of Iran, MOHAMMADKAZEM SADOUGHI, Department of Mechanical Engineering, Iowa State University of Science and Technology, Ames, IA 50011, United States, HAMED SHARIATMADAR, MOHAMMAD ALI AKHAVAN-BEHABADI, School of Mechanical Engineering, College of Engineering, University of Tehran, Tehran 1439955961, Iran — An experimental investigation is performed on heat transfer evaluation of a nano-refrigerant flow during condensation and evaporation inside a horizontal round tube. Experiments are carried out for three working fluid types including: i) pure refrigerant (R600a); ii) refrigerant/lubricant (R600a/oil); and iii) nano-refrigerant: refrigerant/lubricant/nanoparticles (R600a/oil/CuO). Nanoparticles are added to the lubricant and their mixture is mixed with pure refrigerant. Therefore, nano-refrigerants (R600a/oil/CuO) are prepared by dispersing CuO nanoparticles with different fractions of 0.5%, 1% and 1.5% in the baseline mixture (R600a/oil). Effects of different factors including vapor quality, mass flux, and nanoparticles on the heat transfer coefficient are examined for both of condensation and evaporation flows, separately. The results shows that maximum heat transfer augmentation of 79% and 83% are achieved by using the refrigerant/lubricant/nanoparticles mixture, in comparison with the pure refrigerant case in condensation and evaporation, respectively which are occurred for nano-refrigerant with 1.5% mass fraction in both of them.

Mohammadkazem Sadoughi  
Department of Mechanical Engineering, Iowa State University of Science  
and Technology, Ames, IA 50011, United States

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