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Effect of Magnetic Field on the Nanofluid Flow in a Circular Pipe with a Return Bend[1] FERESHTEH RAZMARA, MAHDI TAVAKKOLAGHAEI, Department of Mechanical Engineering, Escola Politcnica, University of So Paulo, So Paulo, SP, Brazil, SINA GOLIZADEH, Department of Mechanical Engineering, Azarbaijan Shahid Madani University, Tabriz, Iran, NAIYER RAZMARA, JULIO ROMANO MENEGHINI, Department of Mechanical Engineering, Escola Politcnica, University of So Paulo, So Paulo, SP, Brazil — In this article, numerical modeling is carried out to investigate the convective heat transfer of AL2O3-water nanofluid in a circular pipe with a return bend under the effect of a magnetic field. The impacts of Reynolds number, Hartmann number, and the volume concentration of nanoparticles on the nanofluid flow and the convective heat transfer behavior are investigated. The results show that the maximum heat transfer occurs in the cross-section with the return bend in a volume concentration of 15. However, by increasing the volume concentration to 20, the Nusselt number decreases. The results indicate that the effect of the magnetic field on the Nusselt number for nanofluid flows with a volume concentration of less than 5 is negligible and sometimes useless. While for volume concentrations 10 and 20 with Hartmann number 20, the ratio of the amount of the local Nusselt number under the magnetic field to the Nusselt number of simple fluid flow is 46.1 and 89.1, respectively. In other words, the heat transfer has increased by 46% and 89%, respectively compared to the simple fluid with der Hartmann number 20.

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Fereshteh Razmara
Department of Mechanical Engineering, Escola Politcnica, University of So Paulo, So Paulo, SP, Brazil

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