

عنوان مقاله:

Convective heat transfer enhancement of the Water-based magnetite nanofluids in the presence of a ۳-D low-intensity magnetic field

محل انتشار:

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خلاصه مقاله:

In the current investigation, Fe_3O_4 water-based nanofluids were synthesized to examine the effect of an alternative ۳-D external magnetic field on its thermal behavioral pattern. A solvothermal method was used to prepare the magnetite nanoparticles. To characterize the nanoparticles, the study employed transmission electron microscopy, X-ray diffraction, Fourier transform infrared spectroscopy, vibrating sample magnetometer and zeta-potential experiments. Vibrating sample magnetometer evaluations thoroughly confirmed the super-paramagnetic characteristics of the nanoparticles. Therefore, exposition of the resulting nanofluids to an AC external magnetic field led to the formation of aligned dipoles parallel to the applied field. Afterwards, the net magnetization in the absence of the external field was set to zero. Thermal measurements demonstrated an enhancement of convective heat transfer coefficients, particularly in the case of more diluted samples. The highest value of h was associated with the most diluted sample, where the h value was two times greater than that in the base fluid at $V=1.4$ V. This was attributed to the augmentation of both the Brownian motions and the viscosity gradients in the centerline of the test section.

کلمات کلیدی:

External magnetic field, Convective heat transfer, nanofluid, Magnetite, Magnetization

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