عنوان مقاله:

Numerical simulation of nanofluid viscosity using molecular dynamics

محل انتشار:

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خلاصه مقاله:

Due to the growing need of industries for heat transfer with higher efficiency and in smaller volumes, researchers have studied the use of nanofluids as a substitute for conventional fluids for heat transfer. In the present paper, viscosity as one of the key thermophysical properties of a fluid has been investigated using molecular dynamics simulations. To perform molecular dynamics simulations, Lamps software has been used. A complete description of the theory of interaction between fluid and nanofluid particles has been investigated in order to achieve the key parameters of nanofluid. A detailed description of the relationships and equations governing phenomena such as potential force applied to various fluid particles and nanoparticles is provided. The validity of the obtained numbers and ratios for the viscosity of nanofluids with different nanoparticle characteristics and pure fluid is measured using the fluctuations of stress correlation functions. Analysis of shear stress correlation function and the results show that the presence of nanoscale particles in the base fluid leads to significant changes in the amount of nanofluid viscosity compared to the base fluid. The ratio of nanofluid viscosity to base fluid viscosity varies in different nanofluids, but it can be seen that on average the minimum viscosity increase is about ۱.۲ times that of the base fluid. Finally, the results obtained from molecular dynamics simulations are compared with the values obtained from experimental results and existing .theories, and comparison charts containing the results are presented

کلمات کلیدی:

Molecular dynamics, Nanofluid, Lamps, Numerical simulation, Viscosity