

عنوان مقاله:

Numerical Simulation Of Non-Newtonian (Herschel-Bulkley Model) Nanofluid On The Vertical Wall With Constant Heat Flux And The Effects Of Reynolds And Rayleigh Numbers On Local And Average Nusselt Number And Surface Friction Coefficient

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خلاصه مقاله:

As plate heat exchangers have numerous applications and there is a lot of heat exchange between solid surfaces and fluids in different industries, the investigation of the heat exchange of fluids with a constant wall heat flux boundary condition, can change an engineer's view in designing heat exchangers including plate heat exchangers. This research deals with numerical investigation of the heat exchange of a nanofluid (with a Non-Newtonian base fluid which has the rheological behavior of Herschel-Bulkley model). As the application of nanofluids especially those with a Non-Newtonian base fluid (such as many lubricating oils whose cooling role in different machinery has been regarded in recent decades) in the matter of heat exchange has not yet completely been recognized, thus, we preferred to use solid nanoparticles in the cooling process of the fluids so that with a growth in the thermal conductivity factor, the heat exchange rate from the fluid to the surface can be increased. In the recent years the use of nanofluids for increasing the heat exchange between fluids and solid surfaces of heat exchangers has become prevalent, so that nowadays in most heat exchange equipment, for a longer durability of components and enhancing the heat exchange rate, different types of nanofluids are utilized due to their high heat exchange factor. In investigating the heat exchange of nanofluids with a Newtonian base fluid (such as water) or Non-Newtonian base fluid (such as different types of industrial oils) two different opinions exist, the assumption of single phase (fluid with solid nanoparticles) and the second is separation of fluid and nanoparticles as liquid and solid phases. Though with the correct determination of equivalent values for density, Viscosity, specific heat capacity and thermal conductivity for the single phase status, we can obtain precise results and there would be no need for a complicated and lengthy two-phase solution. In most papers the single-phase assumption is considered

کلمات کلیدی:

non-Newtonian nanofluid , Herschel Bulkley , convection , vertical plate , numerical simulation

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