## عنوان مقاله:

The effect of volumetric expansion of nanoparticles on free convection of nanofluids in porous enclosures

## محل انتشار:

اولین کنفرانس ملی تحقیقات بنیادین در مهندسی مکانیک (سال: 1397)

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## خلاصه مقاله:

Substances expand or contract as a result of temperature changing. The thermal expansions of solid materials such as nanoparticles are smaller than liquids and gases, but not always insignificant. So, it needs to be considered precisely. In this paper, the common form of Boussinesq approximation is extended to include the volumetric expansion of nanoparticles. This leads to the appearance of a new term in the momentum equation. In order to evaluate the new term impacts, double-diffusive natural convection heat transfer of nanofluid saturated porous medium is taken under consideration. The governing equations are those of presented by Buongiorno. In order to solve the dimensionless form of the governing equations, the finite volume method is utilized. Results are compared with those of the previous works and the outcomes indicate a good agreement. The undeniable effects of nanoparticles volumetric expansion is demonstrated by contrasting the average Nusselt and Sherwood numbers values in cooperation with streamlines, isotherms, isoconcentrations of contaminant, nanoparticles volume fraction for two conditions including considering and neglecting the thermal expansions of nanoparticles, respectively

## کلمات کلیدی:

.Boussinesq approximation, Volumetric expansion, Buongiorno’s mathematical model, Square porous cavity