

عنوان مقاله:

Stability of Nanofluid-Surfactants as Volumetric Receivers in Parabolic Trough Solar Collectors; a Molecular Dynamic Approach

محل انتشار:

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خلاصه مقاله:

Recently, using volumetric receivers as a novel idea to collect solar energy was considered. Solar radiation volumetrically absorbers with a heat transfer fluid which flows through a transparent tube. Nanofluids as working fluids were proposed by different researchers because of their interesting absorption coefficient as well as an important heat transfer coefficient. However, conditions such as the severe temperature gradient in absorber tubes and high temperature of working heat transfer fluid, deteriorate stability of the nanofluids. Considering the kinetic energy of nanoparticles, DLVO potential energy and steric repulsion between nanoparticles, a molecular approach is adopted to investigate the nanofluid stability for different nanofluids with polymeric surfactants and different operational conditions. Two types of polymeric surfactants were considered and stability diagrams introduced to show the conditions for which a nanofluid would be stable. In the case of using PAA for a given temperature gradient, increasing the working fluid temperature required smaller nanoparticle diameters to result in a stable nanofluid (nanoparticles up to ۱۳.۲ nm diameter) and for PMAA, a stable nanofluid can be achieved with larger nanoparticle diameters (about ۸۰nm) while increasing the working fluid temperature

کلمات کلیدی:

Nanofluid, dispersion stability, volumetric receiver, DLVO, polymeric surfactant

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