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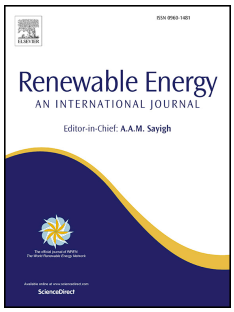

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Influence of hybrid nanofluids on the performance of parabolic trough collectors in solar thermal systems: Recent findings and numerical comparison

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ABSTRACT

Research on solar energy depicted its ability to be converted into thermal energy using trough collector system and solar concentrators, and then to electrical energy using a steam turbine. In this article authors tried to review some solar applications of nanofluids with reference to hybrid nanofluids and their possible use for solar energy systems. The heat transfer performance of ordinary heat transfer fluids (for example: water, ethylene glycol, oils etc) is limited due to their low thermal conductivity. Hence, to increase the overall heat transfer performance of a solar system, a new fluid have to be considered by adding high conductive solid nanoparticles. This was accomplished with the appearance of nanofluids and later on hybrid nanofluids.

In almost all studies and reviews authors are recommending the increase of the research efforts in nanofluids further application in solar systems and this review tries to shed some light on the importance of using new heat transfer fluids, too. Our study demonstrated clearly an enhancement in Nu number for all considered hybrid nanofluids. The highest increase in average Nu is noticed for the Cu-MgO hybrid at 2% volume concentration, where the escalation is almost 14% in comparison with the base fluid. However, the high viscosity escalation for some hybrids determined a high pressure drop penalty. Plus, the collector efficiency rises while Re increase and the 2% Ag-MgO-water hybrid nanofluid offers the maximum efficiency of the solar collector. As a conclusion, hybrid nanofluids are a very good candidate for solar energy systems, especially with reference to solar collectors. Nevertheless, a tremendous experimental and numerical work is needed in order to implement new heat transfer fluids in solar specific applications.