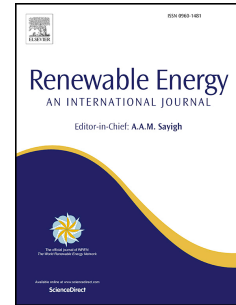


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Influence of hybrid nanofluids on the performance of parabolic trough collectors in solar thermal systems: Recent findings and numerical comparison

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

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11 **ABSTRACT**

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

20 In almost all studies and reviews authors are recommending the increase of the research efforts
21 in nanofluids further application in solar systems and this review tries to shed some light on the
22 importance of using new heat transfer fluids, too. Our study demonstrated clearly an
23 enhancement in Nu number for all considered hybrid nanofluids. The highest increase in average
24 Nu is noticed for the Cu-MgO hybrid at 2% volume concentration, where the escalation is almost
25 14% in comparison with the base fluid. However, the high viscosity escalation for some hybrids
26 determined a high pressure drop penalty. Plus, the collector efficiency rises while Re increase
27 and the 2% Ag-MgO-water hybrid nanofluid offers the maximum efficiency of the solar
28 collector. As a conclusion, hybrid nanofluids are a very good candidate for solar energy systems,
29 especially with reference to solar collectors. Nevertheless, a tremendous experimental and
30 numerical work is needed in order to implement new heat transfer fluids in solar specific
31 applications.

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