

**Table 1**

Summary of principle findings from the numerical works

References	Nano particle properties	Particles size	Concentration	Maximum enhancement	Principle findings
Sidik and Adamu [2]	Ag-Graphene and CuO-Graphene	No information	0.4-1 vol%	43.96% for CuO-HEG	<ul style="list-style-type: none"> <li>Using Reynold numbers of 60e3 and 40e3 and volume fraction of 1%, enhancement of 34.34% and 38.72%, respectively were obtained for Ag/HEG. Similarly, 35.95% and 43.96% were obtained for CuO/HEG at the same Reynolds number and volume fraction respectively.</li> </ul>
Bahiraei <i>et al.</i> , [40]	Tetra Methyl Ammonium Hydroxide (TMAH) coated Fe <sub>3</sub> O <sub>4</sub> nanoparticles and Gum Arabic (GA) coated Carbon Nanotubes (CNTs)	50 nm	0.1 and 0.9 vol% for Fe <sub>3</sub> O <sub>4</sub> (magnetite) and CNT 0 and 1.35 vol%.	2800 W/m <sup>3</sup> K	<ul style="list-style-type: none"> <li>Total entropy generation rates for CNT at concentration of 1.35% and Re 1000 and 2000 gives 0.00119W/K, while for Magnetite at 0.9vol.% and Re 1000, it was found to be 0.00124W/K</li> </ul>
Ghasemi <i>et al.</i> , [41]	TiO <sub>2</sub> –water	Not mentioned	0.25vol%, 0.5 vol% and 0.75 vol%	Not mentioned	<ul style="list-style-type: none"> <li>Heat transfer enhancement increases with an increase in Re.</li> <li>the optimum performance evaluation criterion occurred in Re 490 and 0.75vol% was around 1.23.</li> </ul>
Bahiraei and Abdi. [42]	TiO <sub>2</sub> –H <sub>2</sub> O	20, 40, 60 & 80 nm	1,2, 3 & 4%	66%	<ul style="list-style-type: none"> <li>Observed non-uniform distribution of concentration of nanofluid due to particle migration, thus, for mean concentration of 4% and particle size of 80nm, the amount of concentration increased from the wall to the pipe centre by about 32% and 66% for Reynolds numbers of 1000 and 2000, respectively.</li> </ul>
Sohel <i>et al.</i> , [43]	Cu, Al <sub>2</sub> O <sub>3</sub> - H <sub>2</sub> O – EG	Not mentioned	2, 4 & 6 vol%	Not mentioned	<ul style="list-style-type: none"> <li>Cu-H<sub>2</sub>O has 36% highest decreasing entropy generation ratio, which occurred at 6vol%. Cu-H<sub>2</sub>O and Cu-EG nanofluid gave the maximum decreasing rates of the fluid friction entropy generation rate are 38% and 35% respectively at 6% volume fraction</li> </ul>