

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"> 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.
Bahiraei <i>et al.</i> , [40]	Tetra Methyl Ammonium Hydroxide (TMAH) coated Fe_3O_4 nanoparticles and Gum Arabic (GA) coated Carbon Nanotubes (CNTs)	50 nm	0.1 and 0.9 vol% for Fe_3O_4 (magnetite) and CNT 0 and 1.35 vol%.	2800 W/m ³ K	<ul style="list-style-type: none"> 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
Ghasemi <i>et al.</i> , [41]	TiO ₂ -water	Not mentioned	0.25vol%, 0.5 vol% and 0.75 vol%	Not mentioned	<ul style="list-style-type: none"> Heat transfer enhancement increases with an increase in Re. the optimum performance evaluation criterion occurred in Re 490 and 0.75vol% was around 1.23.
Bahiraei and Abdi. [42]	TiO ₂ -H ₂ O	20, 40, 60 & 80 nm	1,2, 3 & 4%	66%	<ul style="list-style-type: none"> 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.
Sohel <i>et al.</i> , [43]	Cu, Al_2O_3 - H ₂ O – EG	Not mentioned	2, 4 & 6 vol%	Not mentioned	<ul style="list-style-type: none"> Cu-H₂O has 36% highest decreasing entropy generation ratio, which occurred at 6vol%. Cu-H₂O 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