
Abstract

This work presents an experimental and numerical study to investigate the heat transfer enhancement of flat plate solar collector (FPC) using three types of twisted tapes (single twisted tape (ST), double twisted tape (DT) and mixed twisted tape (SDT)) to be compared with plain tube which was used with twist ratios ($TR=2$). The studied concentrations were under fully developed turbulent flow and change of solar radiation with time.

The designed flat plate solar collector (FPC) consists of four pipes with (1.25cm in diameter with 0.1cm thick) placement above the plate to act as heat removal fluid passage ways. Water pump was used to circulate the water through collector. The system consists of two collectors, each one has (40cm x 160cm x 15cm) and connected to two water tanks, each one is 20 liters which has been investigated by conducting outdoor tests in Iraq climatic conditions from October to November 2014. The amount of heat gain from solar radiation depends on many effective parameters are used; type of twisted tape are using, type of collectors plate metal (aluminum or copper), value of Reynolds number, amount of sun rays available at the site, number of glass covers and orientation of the collectors with respect to the south direction.

The experimental results demonstrate that the double twisted tape are more efficient than the single twisted tape and mixed twisted tape for heat transfer enhancement to increase the output temperature of the working fluid more than friction factor.