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Experimental Studies on Heat Transfer and Friction Factor Characteristics of Forced Circulation Solar Water Heater System Fitted with Left-Right Twisted Tapes

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Abstract

Experimental investigation of heat transfer, friction factor and thermal performance of left-right twisted tape solar water heater with various twist ratios have been studied and compared with a plain tube collector at the same operating conditions with Reynolds number varied from 3000 to 23000. The empirical correlations developed for Nusselt number and friction factor with various left-right twist ratio ($Y= 3, 4, 5, 6$) were fitted with the experimental data with in $\pm 15\%$. Results confirmed that the heat transfer augmentation in left-right twisted tape collector was better than plain tube collector. Compared to various twist ratios, heat enhancement and pressure drop were higher with minimum twist ratio, 3. While comparing the absorber plate temperatures for twist and plain tube collector, it was found to be minimum for twisted tape collector, because higher heat transfer rate reduces the heat losses and increases the thermal performance.

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