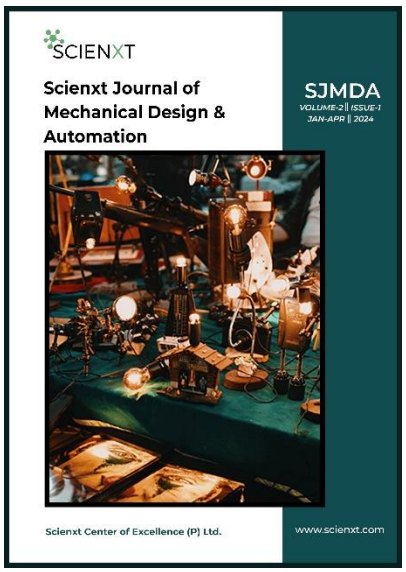

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"Improving heat transfer efficiency in heat exchangers: an in-depth investigation through experimental and computational analyses in tubular systems with wavy counter twisted tape inserts"

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Abstract:

Flow friction and heat transfer behavior in a Wavy twisted tape swirl generator inserted tube are investigated experimentally and Verificate in CFD The performance of heat exchanger with water as the working fluid becomes particularly important due to the thermal resistance offered by water in general. In order to compensate for heat transfer property of water, the surface area density of heat exchanger can be increased. The Growth of heat transfer in the use of wavy twist tape inserts with different twist tape ratio. The wavy twist tape generate vortex between the flow wavy Twist tape facilitate the exchange of more heat near the wall with the fluid in the core boundary layer is altered. It result heat transfer gradient at the surface which leads to the growth in heat transfer. Wavy Twist tape insert with twist ratio 8.33, 9.33 and 10.22.

The horizontal tube was subjected to constant mass flow rate & constant input cold & hot supply of water. The work include the Determination of friction factor heat transfer coefficient, overall heat transfer coefficient in the experimental setup for twist ratio 8.33 , 9.33 and 10.22 varies from 1.8 to 2.9 The result is also compare with the computational method. CFD technique is employed to perform optimization analysis of mesh insert.

The horizontal pipe along with mesh insert was modeled in ANSYS Fluent. CFD analysis was performed for twist ratio 8.33, 9.33 and 10.22. For twist tape it was observed that the heat transfer coefficient vary from which varied from 2.34 to 3.10 times as compared to other. It was also observed that with increases in Reynolds number, the heat transfer coefficient increases whereas the friction factor decreases. The result of computational investigation observed that the heat transfer coefficient vary from 1.9 to 3.9 times the smooth tube & the friction factor increased by 2.4 to 7.8 times the smooth tube. Computational investigation is the true for our experimental investigation & this validate the all result experimental result.

Keywords:

Heat Exchanger, Heat transfer coefficient, friction Factor, CFD Analysis, Experimental Analysis