

CFD SIMULATION OF THERMOSYPHON-TYPE SOLAR DOMESTIC HOT WATER HEATING SYSTEM

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Abstract

This paper presents use of Computational Fluid Dynamics (CFD) programme (Fluent) to validate the experimental results of thermosyphon - type solar domestic hot water systems (TSDHWS) already investigated under the standard test conditions by different research scholars. Commercially available TSDHWS have been used in the experimental investigation. The CFD is used to validate those observations. The characteristic parameters of the TSDHWS have been obtained on the basis of each procedure/standard. CFD Simulation has been carried out for ten days time period and is summarized and presented. A 3-D model of conventional solar water heating system is developed using GAMBIT. As the computational domain of geometry is cylindrical in shape, the Tet type of cell has been used. The meshing of collector tube is performed by mesh extrusion process and tank is meshed with hexahedral element. Test standard experimental data of TSDHWS were verified with fluent results. Good agreement was achieved. It is therefore concluded that entire solar system can be well simulated using fluent code. This methodology can be used to design TSDHWS for different applications at varied climatic conditions.

Keywords: CFD, Fluent, Thermosyphon-type Solar Hot Water System