

Analytical and Experimental Analysis of Thermocline Thermal Energy Storage Tank

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Fig. Photograph of experimental set up

Thermal energy storage systems are essential to fulfil the mismatch between thermal energy supply and energy demand. In particular, it is necessary in solar thermal energy systems because of the discontinuous nature of solar radiation. Thermocline energy storage systems have higher thermal efficiency and relative lower cost. The effectiveness and cost of thermal energy storage systems is the subject of continuous research for the improvement. A major issue in this system is achieving stable thermal stratification and the destruction of thermocline during charging and discharging process. An analysis of the stratification in thermocline cylindrical tank storage systems is presented in this paper using an energy balance model and validate with experimental data. Also experimental analysis is conducted at a different mass flow rate and at different operating condition. The degradation of thermocline during static mode has been studied experimentally. The thermocline degradation is less due to new inlet design, aspect ratio 3, lower thickness and Richardson number 6.44 obtained.