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Performance Characterization of a Parabolic Trough Collector

This thesis presents a complete characterization of the parabolic trough collector, which is established in the laboratory Archimedes solar energy on the roof of the 'Dorothea' building. The collector is used for hot water generation and is connected with a hot water storage tank and a water pump for the circulation of the fluid.

The research objectives of this study developed and analysed in detail, are the designation of the thermal efficiency, the time constant, the collector's acceptance angle and the collection of measurements of thermal energy for various days of the year.

The approach of the research objectives carried out theoretically, with optical and thermal analysis of the collector, which is in-depth analysis of the factors affecting the performance of the system and then accessed by experimental process by taking measurements in accordance with U.S. standard ASHRAE STANDARD 93 -2010.

The results of experimental measurements are graphically presented, from where the time constant, the angle of incidence and the thermal efficiency of the collector are extracted. Then the system is modelled using the TRNSYS software and calculated the long-term performance of the collector with the meteorological data of Cyprus.

In addition to the last chapter of the thesis, are presented recommendations for the improvement of collector efficiency studied, and recommendations for further development in future research programs of the CUT.