

COMPUTER SIMULATION OF THERMOSYPHON SOLAR WATER HEATERS

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Summary

The purpose of this project was to investigate the performance characteristics of typical Cypriot thermosyphon solar water heaters. Five design configurations of the Cypriot thermosyphon solar system were modeled and simulated by using the TRNSYS simulation program.

This project is divided into six chapters.

In the first chapter an introduction was made about Solar water heating, the solutions for performance predictions, and generally about the objectives of this study.

In the second chapter the individual parts of the thermosyphon solar water heater, the factors affecting the operation of each part, and the performance of the system were analyzed.

In the third chapter a theory was established concerning the representation of solar systems in models. The advantages obtained for modeling approaches were listed and the various types of models were analyzed.

In the fourth chapter a theory was developed about TRNSYS simulation program, a general description for the systems tested was made, the subroutines representing the parameters of the models were defined. And then detailed drawings for the models tested were illustrated.

In the fifth chapter the simulation results which were illustrated in graphic presentations were analyzed. This chapter also includes tables with the results obtained by daily and yearly simulations, and also schematic diagrams illustrating the five models tested.

Finally in the last chapter the most important results were listed and also an optimisation was carried out according the simulation results of each system.

The results of this investigation indicated that the models with external auxiliary heaters are the most reliable among the models tested since they present the highest performance. Another significant observation was that the model having a vertical storage tank and built-in auxiliary heater, presents much better performance characteristics when the auxiliary heater is fitted at a higher level in the storage tank.

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