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THERMODYNAMIC DESIGN AND OPTIMIZATION OF A SOLAR-DISH POWERED STIRLING ENGINE

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Abstract

A thermodynamic model for accurately predicting the overall efficiency and power output of a solar assembly using a Stirling engine is presented. It is based on the application of the First Law of Thermodynamics for Processes with Finite Speed and uses the Direct Method. The proposed model could also be used to better design receivers that concentrate the solar radiation and to properly size the receiver cavity for a dish solar concentrator. Examples of the optimization of the performance of Stirling engines are also included, as is a comparison of the optimization results with actual performance data from operating solar Stirling engines.

Key words: Direct Method, finite speed processes, irreversibilities, receiver design, solar Stirling engine

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