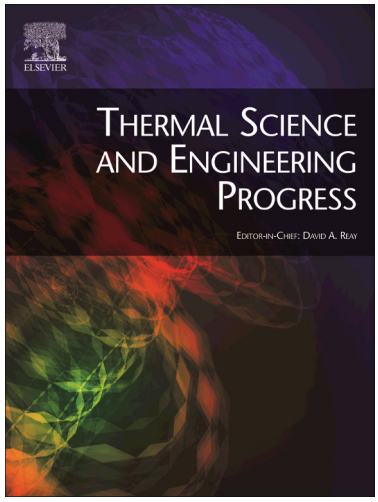

Review on Solar Stirling Engine: Development and Performance

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Review on Solar Stirling Engine: Development and Performance

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Abstract

Solar dish-Stirling system has proved to be the most efficient way to generate electricity using solar energy. Due to the increasing commercialization of this technology, the need for maximizing overall efficiency, and minimizing losses and cost has become an important area of interest for researchers. In the past few years, the research on modeling, thermodynamic performance analysis, simulation studies and techno-economic analysis of solar dish-Stirling engines have gained pace. Many parameters like concentration ratio, absorber temperature, hot temperature, cold temperature, regenerator effectiveness, working fluid, dead volume and average working pressure values are generally considered for the performance analysis of dish-Stirling systems. Researchers have observed that by increasing the concentrating ratio and absorber temperature the thermal efficiency increases. The maximum thermal efficiency reported for the dish-Stirling system is 32% for an absorber temperature of 850K and the concentration ratio of 1300. Although regenerator losses tend to reduce the overall efficiency. Energy and Exergy efficiency for the dish-Stirling system were reported to be 17% and 19% respectively wherein major losses occurred in the receiver. However, thermal efficiency as high as 84% can be obtained for the receiver system. A synthesis of results indicates that dish-Stirling technology can cost-effectively produce power with comparatively better performance than other renewable systems. Moreover, incorporation of hybridization and thermal storage have emerged as a particularly favourable option for more continuous operation of the system.

Keywords: dish-Stirling engines; Receivers; Performance; Commercial applications