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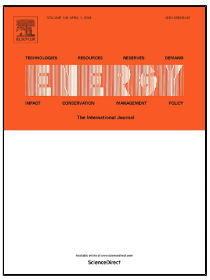

Performance Analysis and Optimization of an Integrated Azimuth Tracking Solar Tower

Peng Hu, Weidong Huang

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Performance Analysis and Optimization of an Integrated Azimuth Tracking Solar Tower

Peng Hu[2] and Weidong Huang[1*]

*[1] **Anhui Province Key Laboratory of Polar Environment and Global Change,** Department of Geochemistry and Environmental Science, [2]Department of Thermal Science and Energy Engineering, University of Science and Technology of China*

96 Jinzhai road, Hefei, Anhui 230026

**Corresponding author: Huang, email: huangwd@ustc.edu.cn*

Tel: 86 551 63606631 [O], Fax:86 551 63607386

Abstracts:

A new design named as integrated azimuth tracking solar tower is presented in which all of the heliostats and receiver are installed on an azimuth tracking device, multi heliostats are fixed to one horizontal shaft which rotate to track the solar elevation variance to reduce the number of tracking device. An optical and thermal performance model is developed and validated for it. Its annual performance is studied and the design is optimized with the model. The results show that the annual averaged optical efficiency of optimized design is about 77%, and net solar heat efficiency is about 70% with a geometrical concentration ratio of 300. Its efficiency is rather near to the solar dish, and about 20% higher than that of the conventional solar tower system. The increased efficiency comes mainly from the improvements of cosine factor as it always works with azimuth=0. Only 88 tracking devices are needed for two direction tracking of 1200 heliostats. The number of tracking devices is greatly reduced to decrease the cost and system complexity, increase the availability of the system. So the integrated azimuth tracking solar tower may be a potential solar energy technology.

Keywords:

Integrated azimuth tracking solar tower, Numerical model, Optical efficiency, Optimization, Point focus Fresnel solar collector, Solar tower.