Potential of the Heliostat Field of a Multi Tower Solar Array

***Philipp Schramek and **David R. Mills**

*** Technische Universität München, Lehrstuhl Professor Thomas Herzog,**

Arcisstr. 21, D-80333 München, Germany, Phone: +49-89-289 286 76, Fax: +49-89-289 286 75,

E-mail: philipp.schramek@lrz.tu-muenchen.de

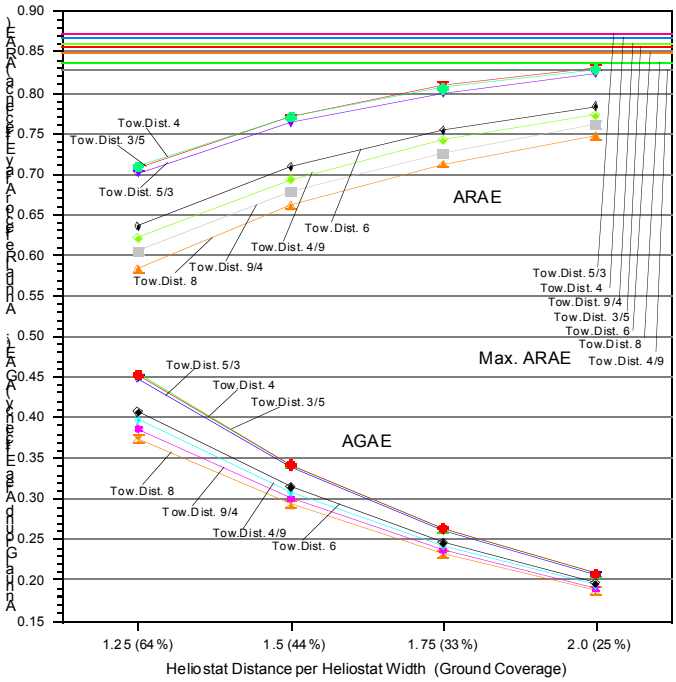
****Department of Applied Physics, University of Sydney, Sydney, Australia, 2006,**

Phone: +61-2-9351 3311, Fax: +61-2-9924 2016, E-mail: D.Mills@physics.usyd.edu.au

The Multi Tower Solar Array (MTSA) is a new concept of Solar Towers, which was proposed by Mills and Schramek [1]. The heliostats of an MTSA concentrate the solar radiation onto several tower-mounted receivers instead of a single central receiver. With this concept it is possible to greatly reduce the ground area required by the heliostat field by using a closely spaced regular geometrical array of reflectors. The configuration of an optimised heliostat field of an MTSA can be described by three parameters. The basic parameter of this three, the Receiver Number Parameter (RNP), describes the number of receivers the heliostats within a region of the field are directed to.

We present the basic configuration (RNP-distribution) and the Efficiency distribution within the field for some different assumed tower and heliostat distances which are results of the optimisation. So far these optimisation was only done for fields with square repeating cells. New calculations for triangle cells and hexagonal shaped mirrors will be presented.

Fig .1 shows Characteristic Curves of the Annual Reflector Array Efficiency (ARAE) and the Annual Ground Area Efficiency (AGAE) of optimised configurations of an MTSA for changing tower and heliostat distances (ground coverage) with ground coverage from 25% to 64%. With the heliostats mounted in a certain way 100% ground coverage is possible. Result for such calculations will be presented.



The height of the towers depends on the distance of the towers and therefore on the mirror area concentrating the solar radiation onto each receivers and therefore on the power the receivers are designed for. Estimations of the peak power, of the needed tower height and the number of towers depending on the receiver design and the given ground area will be presented as well.

References

[1] Mills, David R. and Schramek, Philipp; Multi Tower Solar Array (MTSA) with Ganged Heliostats; Proceedings of the 9th International Symposim on Solar Thermal

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