Engineering Models for Solar Tower Technologies (SEI-2)

Scientific Achievement:

We developed a detailed procedure to arrive at the critical parameters of solar tower technology (e.g., tower height, mirror area, receiver sizing) for a chosen capacity, storage conditions, and location of tower.

Significance and Impact:

This research demonstrates a novel approach to estimate the solar tower parameters. This work will be translated into a computational model that helps in analyzing the performance (both technical and financial) of solar towers.

Research Details:

- Performed detailed literature survey of the existing tower plants (operational and under construction) to benchmark the parameters related to solar towers.
- Developed detailed engineering models for heliostat layout, receiver size estimation, and shadowing and blocking.
- Computed annual efficiencies from the models developed for a heliostat layout similar to that of Gemasolar power plant (Fig 1).
- Determined annual reflected energy from the heliostat field to establish the field boundary.
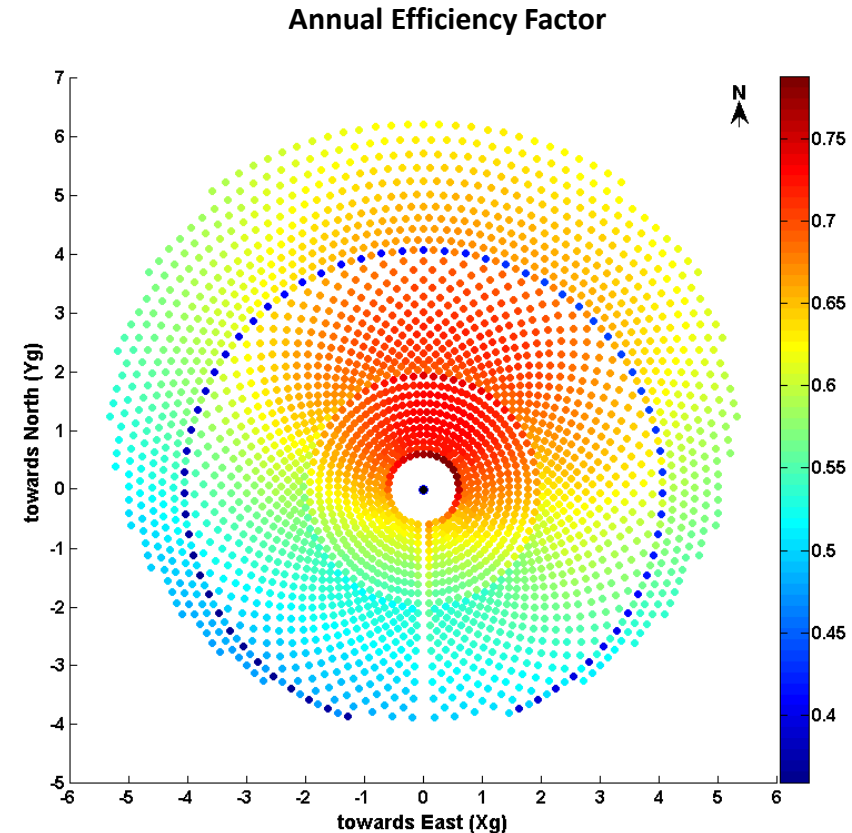

Annual Efficiency Factor

Fig. 1. Annual efficiency factors of Gemasolar field considering cosine, attenuation, and shadowing and blocking effects.

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