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**First Application of the Flux Mapping System SCATMES
for Secondary Concentrator Performance Analysis**

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ABSTRACT

The flux distribution of concentrated solar radiation is often measured using the Lambertian target and video camera technique. Such systems perform a two-dimensional flux map by moving a diffuse reflecting target into the solar beam and taking an image of the reflection pattern with the camera.

At the DLR solar furnace recently the new flux mapping system SCATMES was developed especially for difficult tasks, e.g. the flux distribution measurement directly behind optical devices like filters or secondary concentrators /1/.

SCATMES uses a diffuse reflecting target bar moving perpendicular to the optical axis. A camera which is integrated in the compact system looks at the target also perpendicular to the optical axis, i.e. in the direction of the target movement.

Experiments at the DLR solar furnace prove the capabilities of a prototype of the SCATMES flux mapping system. In an experimental setup for the performance evaluation of different kinds of non-imaging optical devices the performance of two different types of secondary concentrators and of two other optical radiation shaping devices (radiation homogenizer) was analyzed.

The main task for SCATMES in these experiments is the measurement of power and peak flux in front of the respective optical device and behind it. Therefore, the flux mapper has to be moved from the device's entrance in the focal plane to the exit aperture within the shortest possible time to keep constant radiation conditions. A flux mapping as near as possible behind the device's exit is necessary.

The paper shows the technical solution of this measurement task with the help of SCATMES as well as the results regarding the performance analysis of the secondary concentrators and the two other optical radiation shaping devices.

/ 1 / Neumann, A., Schmitz, A., 1999, "The SCATMES Device for Measurement of Concentrated Solar Radiation", Transactions of ASME Vol. 121 (p. 116-120)