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Results of the Second Fluxmeter Intercomparison Campaign

J. Kaluza, A. Neumann
jens.kaluza@dlr.de
Tel: +49 2203 601 2482
Fax: +49 2203 66900
Deutsches Zentrum für Luft- und Raumfahrt
D-51170 Köln

A. Ferriere, Jean-François Robert
ferriere@imp-odeillo.fr
Centre National de la Recherche Scientifique
BP5 – 66125 Font-Romeu Cedex, France

ABSTRACT

Fluxmeters are used in every solar concentrating facility to determine the radiative energy that is introduced in a solar process. The accuracy of the radiation measurement affects most of the results achieved at the facility.

For the examination of the performance of the instruments in the Solar PACES Flux Measurement Group two radiometer intercomparison campaigns were performed during the last 4 years. Here several fluxmeters were compared under real conditions in concentrated sunlight. The first campaign with 26 flux gauges from nine Institutes was held in 1996. Results showed that there was a need for a more detailed look on the performance of the fluxgauges. Some problems were addressed, concerning the operation of the gauges and the experimental procedure of the comparison.

From October 5th to 31st 1998 the second fluxmeter intercomparison campaign was held at CNRS IMP in Odeillo, France. In this campaign seven teams from 5 countries (Australia, Germany, France, USA, Switzerland) had the opportunity to compare their flux measurement devices to 9 others. 4 of the 10 flux gauges were non-commercial devices developed by the participants. The comparison was done in 3 groups with five gauges each.



Fig. 1: Detailed look on three fluxmeters mounted in a cooled panel (backside) in the focal plane of the 1MW solar furnace in Odeillo, France.

During three weeks of intensive work about 250 data points were taken for the comparison of the 10 radiometers. The flux range was varied from 50 to 800 W/cm². The results show that most fluxgauges work with good reproducibility. The maximum deviations were significantly reduced with respect to the results of the previous campaign in 1996. Nevertheless, the absolute values determined with the instruments show deviations (up to 6%) that exceed the expected error ranges of the instruments. The results are analyzed regarding the design of the gauges and the operating conditions during the measurements. We give an overview on the realization of the campaign, focussing on the results that may be of interest for any users of commercial fluxgauges.