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# Transferability of stray light corrections among array spectroradiometers

S. Nevas (1), A. Sperling (1), and B. Oderkerk (2)

(1) Physikalisch-Technische Bundesanstalt (PTB), Braunschweig und Berlin, Germany (saulius.nevas@ptb.de), (2) Avantes BV, Oude Apeldoornseweg 28, NL-7333 NS Apeldoorn, The Netherlands

Array spectroradiometers are increasingly used for monitoring the solar radiation at the Earth's surface. Although having a number of advantages, such as the parallel mode of operation enabling a fast sampling of the solar spectrum, affordability, compactness and transportability, the instruments have to be carefully characterized in order to enable the measurements with the acceptable uncertainties.
One of the most important properties of the instruments to be considered is the spectral stray light characteristic. Due to their compact design, the stray light suppression of the instruments is limited, especially in the UV spectral range. However, numerical correction methods exist that enable a correction of the stray light effects using a simple matrix multiplication operation [1]. Provided that the stray light properties of an array spectroradiometer are accurately known, an improvement of the stray light suppression by one to two orders of magnitude is possible. The determination of the correction matrix, however, requires comprehensive characterizations by using wavelength-tunable lasers as, e.g., in [2]. Yet, the efforts and costs of the stray light characterization could be minimized provided that the stray light correction matrix determined for an instrument is stable and also transferable to other instruments of the same type, i.e. the same correction matrix is effective on a number of array spectroradiometers.

In this paper, we study the transferability of stray light correction matrices among array spectroradiometers. Instrumental properties of the spectroradiometer defining the portability of the stray light corrections from one instrument to another are discussed and examples based on the stray light characterization, hardware optimization and test measurements with a number of instruments are shown.

References

1. Zong Y, Brown S W, Johnson B C, Lykke K R and Ohno Y 2006 Simple spectral stray light correction method for array spectroradiometers Appl. Opt. 45 1111–9
2. Nevas S, Lindemann M, Sperling A, Teuber A and Maass R 2009 Colorimetry of LEDs with array spectroradiometers MAPAN—J. Metrol. Soc. India 24 153–62