Polarimetric calibration of the spaceborne directional polarimetric camera installed on the GF5 satellite

Yinlin Yuan[a*], Qing Kang[a], Jianwen Weng[a,b], Xiaobing Zheng[a], Lei Ding[a], Jianjun Li[a], HaoyuWu[a], Jin Hong[a], and Zhen Liu[c]

[a]*Key Laboratory of Optical Calibration and Characterization, Anhui Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, Hefei 230031, China*
[b]*University of Science and Technology of China, Hefei, Anhui 230026, China*
[c]*Hefei University, Hefei 230601, China*

[*]*Presenting author (ylyuan@aiofm.ac.cn)*

The Spaceborne Directional Polarimetric camera (SDPC) is dedicated to obtain an accurate description of clouds and microphysical properties of aerosol particles via multi-angle, multi-spectral and multi-polarization observations. It images the Earth with 110° field of view in three polarimetric spectral bands and five non-polarimetric spectral bands from visible to near infrared. Due to its wide field of view telecentric optical system, multi-channels and 512×512 pixels detector array, the polarization sensitivity of optical components (PSOC) and non-uniform response of pixels (NURP) are the main uncertainty factors of polarimetric calibration. In this paper, a polarimetric calibration model of RDPC has been constructed for increasing the measurement accuracy. Combined an integrating sphere with a generator as polarized light source, the PSOC can be measured in high accuracy by using the Fourier series analysis method which reduces the impact form the alignment error of the generator. The sectional viewing field measurement method is used to acquire the NURP while the large aperture integrating sphere served as reference source. Then the data of NURP have been corrected by the relative transmittance of high frequency and low frequency respectively for polarized channels. The experimental results show that the polarization measurement errors of the RDPC in 0°, 15°, 30° and 45° half viewing field are all less than 0.25% when the reference source's degree of polarization is better than 0.2% [1–4].

References

[1] González, A., B. Mayer, J.-F. Gayet, *et al.*, 2003: Multilayer cirrus cloud property retrieval using dual-view ATSR-2 instrument. *Proc. SPIE* **448**, 224–231.
[2] Ligang, C., 2015: Polarimetric Calibration of the polarization CCD camera with large viewing field. *Opto-Electron. Eng*. **42**(2), 15–20.
[3] Thierry, B. D., A. Yves, and J. M. Laherrere, 1993: Pre-flight calibration of the POLDER instrument. *Proc. SPIE* **2553**, 218–231.
[4] Deuze, J. L., F. M. Breon, C. Devaux, *et al*., 2001: Remote sensing of aerosols over land surfaces from POLDER-ADEOS-1 polarized measurements. *J. Geophys. Res*. **106**, 4913–4926.

Preferred mode of presentation: Oral