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ABSTRACT

PRESENTATION

PAPER

Matheus Pereira Porto received bachelor, master and doctoral degree in mechanical engineering (heat and fluids) from the Federal University of Minas Gerais in Belo Horizonte, Brazil in 2007, 2010 and 2013 respectively. He is currently a professor with the Mechanical Engineering Department at the Federal University of Minas Gerais and the head of the LabTerm (Laboratory of Thermometry), which is a laboratory dedicated to the thermography technology. His research interests include thermography, photovoltaics, and energy storage.

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MWIR CAMERA CALIBRATION FOR CO_2 QUANTIFICATION

This article presents the calibration procedure for a MWIR cooled infrared camera equipped with a spectral filter for CO_2 quantification. The method we applied is a combination of mathematical models and experimental procedures, and it can be divided in:

(i) experimental data collection

(ii) application of computational routines and regression models.

We used a calibrated flat-plate blackbody radiator as the radiance source in the range of 20 °C to 80 °C with an estimated emissivity of 0,98. We employed a spectral radiative heat transfer model to describe the irradiance onto the detector and a polynomial regression to establish the relation between output signal and temperature. The regression model showed a consistent interpolation error across the calibration interval with a maximum absolute deviation of 0,08 °C. The validation results showed that the calibration scheme proposed in this article achieved great accuracy and consistency even at intermediate values, with a maximum deviation of 0,20 °C.