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EXPERIMENTAL DETERMINATION OF RADIATIVE PROPERTIES OF SEMI-TRANSPARENT COMPOSITE MATERIALS WITH ROUGH BOUNDARIES

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ABSTRACT. This study deals with the identification of the absorption and scattering properties of fiberglass-epoxy composites at temperatures below their degradation temperature. We use an inverse method based on a Gauss Newton algorithm in order to minimize the sum of the squared difference between theoretical and experimental transmittance and reflectance. Two experimental setups were used in this work. The first one is a spectrometer equipped with a goniometric system and a heated sample holder which enable to measure bidirectional transmittance and reflectance up to 200 °C. The second device measures simultaneously the normal-normal and the normal-hemispherical transmittances and reflectances of a sample subjected to a laser irradiation with tunable wavelength while a temperature rise is applied by means of a CO_2 laser. Theoretical results are retrieved by employing the Monte Carlo method for solving the Radiative Transfer Equation. This study reveals that radiative properties of the studied material are strongly temperature-dependent starting from 100 °C.

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