

Impact of Modifying the Surface Materials on the Radiative Heat Transfer Phenomenon

Authors : Arkadiusz Urzędowski, Dorota Wójcicka-Migasiuk, Andrzej Sachajdak, Magdalena Paśnikowska-Łukaszuk

Abstract : Due to the impact of climate changes and inevitability to reduce greenhouse gases, the need to use low-carbon and sustainable construction has increased. In this work, it is investigated how texture of the surface building materials and radiative heat transfer phenomenon in flat multilayer can be correlated. Attempts to test the surface emissivity are taken however, the trustworthiness of measurement results remains a concern since sensor size and thickness are common problems. This paper presents an experimental method to studies surface emissivity with use self constructed thermal sensors and thermal imaging technique. The surface of building materials was modified by mechanical and chemical treatment affecting the reduction of the emissivity. For testing the shaping surface of materials and mapping its three-dimensional structure, scanning profilometry were used in a laboratory. By comparing the results of laboratory tests and performed analysis of 3D computer fluid dynamics software, it can be shown that a change in the surface coverage of materials affects the heat transport by radiation between layers. Motivated by recent advancements in variational inference, this publication evaluates the potential use a dedicated data processing approach, and properly constructed temperature sensors, the influence of the surface emissivity on the phenomenon of radiation and heat transport in the entire partition can be determined.

Keywords : heat transfer, surface roughness, surface emissivity, radiation

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