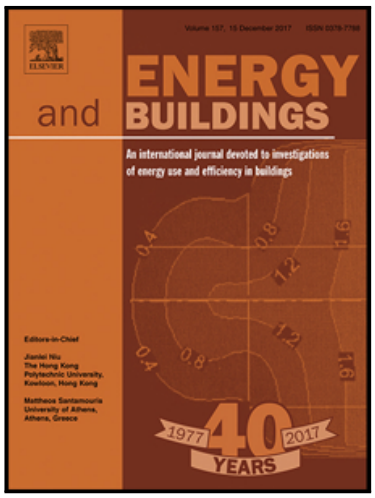

Description and ASSESSMENT of the BUILDING SURFACE TEMPERATURE modelIING IN LASER/F

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DESCRIPTION AND ASSESSMENT OF THE BUILDING SURFACE TEMPERATURE MODELLING IN LASER/F

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Abstract: LASER/F is a physical thermo-radiative model designed to simulate the 3D surface radiative and energy exchanges in urban environments, which can provide, among other physical variables, detailed distribution of building surface temperature over time. This paper aims at presenting in details the algorithms behind the estimation of the surface temperature and assessment results. The assessment relies on a set of in-situ measurements acquired over the facade of a large building on the university campus of Strasbourg (France) during a continuous 36 hours period in July 2016, combining a thermal camera FLIR SC655, a non-imaging multi-spectral thermal radiometer Cimel Climat and two albedometers (Kipp & Zonen). The adequate model settings are defined following a preliminary sensitivity analysis of LASER/F aiming at quantifying the impact of facade material structure and properties on final results, and at finding the proper balance between accuracy and computation time. LASER/F is then used to model the building surface temperature kinetic over the data acquisition period. Results demonstrate the ability of LASER/F to adequately reproduce the behavior and magnitude of building surface temperature (RMSE 1.31°C), even with a coarse 3D representation of building geometry and surrounding environment, and highlight the need for accurate description of building material properties.

Keywords: thermo-radiative model, building surface temperature, urban simulation, thermal images, LASER/F