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Evaluation of Outer Structure on Solar Reflection Characteristics of Highly Reflective Material in Consideration of Human Thermal Sensation

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Abstract. As a solution of the influence on thermal comfort in urban street by constructing building surfaces with highly reflective materials, it is considered to control the directional reflection of the materials and to reflect most of the solar radiation to the retro reflective direction same as incident direction of solar radiation. In this study, the directional solar reflectance of building cover material with uneven surface is experimentally and numerically evaluated. In evaluation of human thermal comfort, what we show are strong impact of radiation for human thermal comfort and reduction of radiation is the way to establish better thermal environment. From this point, use of high reflective material is good idea for improvement and consideration of retro reflection is better concept. The simulation results show that human thermal comfort is determined by retro reflection if the reflectance is the same. Improvement effect of 50% retro reflection for 30% reflection is larger than 20% reflectance on the basis of human thermal sensation.

Keywords: Heat island, Solar radiation, Building outer skin, Retro reflection, Human thermal load