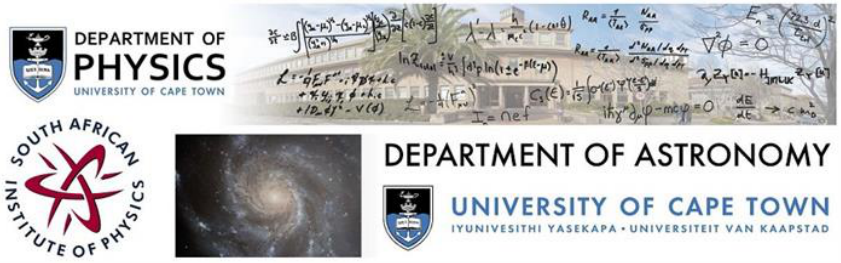

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Characterization and Thermal Load Impact of Reflective Coatings on a Low Cost House in Alice, South Africa

Wednesday, 6 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
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Optical properties of paint include transmission or reflection of infrared radiation. These properties can improve building energy consumption by minimizing uncontrolled heat transfer through the thermal envelope. The aim of this study is to investigate the thermal insulation properties of reflective coatings. Scanning Electron Microscopy/Energy Dispersive X-ray spectroscopy (SEM/EDX) was adapted to characterize the surface morphology and elemental composition of the coat. The IR wavelength transmission range of the coat was also analyzed using Fourier Transform Infra-Red (FTIR) techniques while thermal camera was used to analyze its thermal resistance. A low-cost house in Golf Course, Alice was used to analyze the thermal load impact of the reflective coats on the wall inner surfaces. The thermal load of the building before and after coating was determined using monthly energy-balance method. The SEM image shows that the coat is transparent to light. The presence of Al as Al2O and other elements were revealed by the EDX spectrum. A strong reflection of IR radiation between 8.00 μm and 15.00 μm of the Mid-IR region was observed from the FT-IR spectrum. To maintain the indoor temperature within the comfort zone, the occupants will consume a maximum heating energy of 9.35 kWh/m2 in winter season and cooling energy of 5.66 kWh/m2 in summer season. After coating, the heating energy was reduced by 34%, amounting to 4.99 kWh/m2 and 30% reduction in the cooling energy, to give 2.53 kWh/m2. The reflective coating reduces the heat transfer through the building walls by reflecting mid-IR radiation, thereby decreasing the thermal load. Hence, it is a suitable building thermal insulation material.

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