EXPERIMENTAL STUDY OF THE EFFECTIVE BRDF OF A COPPER FOAM SHEET

W. J. Zhang, J. M. Zhao, and L. H. Liu
Harbin Institute of Technology NO. 92 West Dazhi Str. Harbin, 150001 China

ABSTRACT. Metal foam is a new kind of functional composite material, which has found applications in many engineering fields. The porous structure of metal foam makes it very attractive to be used as working material for heat transfer. The radiative characteristics of metal foam are important in thermal analysis and engineering of the instruments based on metal foams at high temperatures or in the solar energy conversion process. This work conducted experimental study on the effective surface characteristics of a copper foam sheet. The bidirectional reflectance distribution functions (BRDF) of the copper foam sheet (pore density is 90 ppi and porosity is 98.6%) at the wavelength 660nm were measured at 6 different incident angles, 0°, 15°, 30°, 45°, 60° and 75° respectively. The variation of the BRDFs with incident angle is analyzed. An asymmetry parameter is introduced to measure the anisotropy of the BRDFs. A strange reflecting characteristic of the copper foam sheet is observed: the reflected energy at the backward direction is greater than the forward in the conditions of oblique incidence. With the increase of the incident angle, the asymmetry parameter decreases, the high reflected energy area becomes larger, and the integrated hemispherical reflectance increases.
KEYWORDS**.** Surface radiative characteristics, BRDF, Metal foam, Hemispherical reflectance