ME4252 Nanomaterials for Energy Engineering

Solar Energy

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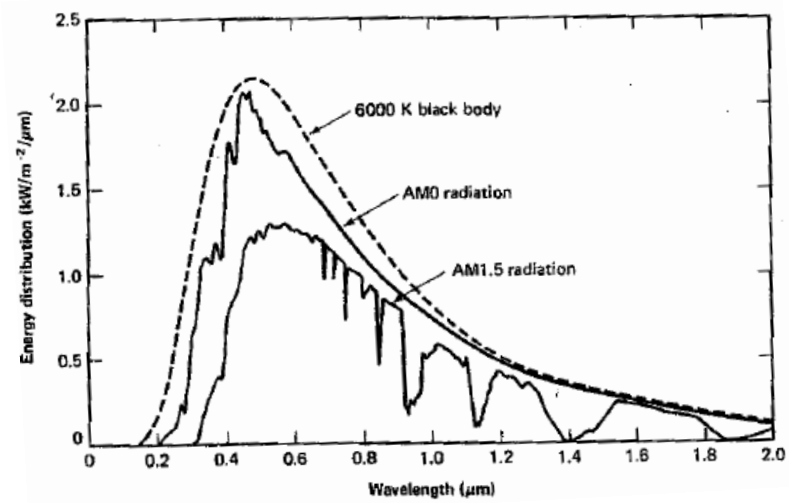
Spectral distribution of sunlight

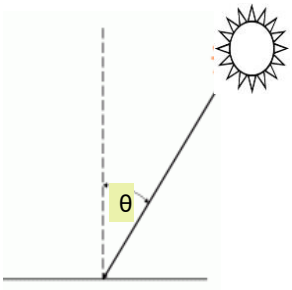


AM0 and AM1.5 are shown in Fig. together with the radiation distribution expected from sun if it were a black body at 6000K.

Standard spectrum: Concept of air mass

The Air Mass quantifies the reduction in the power of light as it passes through the atmosphere and is absorbed by air and dust. It is defined as :

$$\text{Air mass} = \frac{1}{\cos\theta}$$



The solar radiation outside the Earth's atmosphere is called ***AM0 (1.367 kW/m²) – relevant for satellite applications***

When the sun is directly overhead ($\theta = 0$), AM1.

Air mass

Air Mass is the path length which light takes through the atmosphere normalized to the shortest possible path length (that is, when the sun is over head)

$$\text{Air mass} = \frac{\text{path length of radiation through atmosphere}, l}{\text{shortest path of radiation through atmosphere}, l_0}$$

A typical spectrum for moderate climates is AM1.5 – angle of incidence, θ is **48.2⁰**

AM1.5 is standard spectrum of sunlight for measuring the efficiency of solar cell at the Earth's surface (all laboratory measurements refer to this standard), total power density content is 1 kW/m² (close to maximum received in earth surface)