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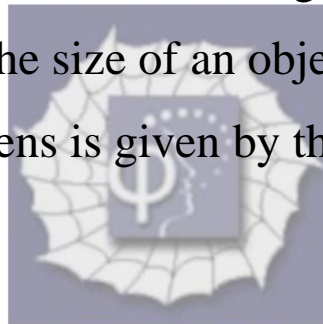
**Problem 44.13 (RHK)**

*Suppose that image of the Sun is focussed on a screen using a thin lens whose focal length is 27 cm. We have to find the diameter of the image.*

**Solution:**

We will use the result that the magnitude of the lateral magnification of the size of an object and its image formed by a thin lens is given by the relation

$$|m| = \left| \frac{i}{o} \right|,$$



where  $o$  is the object distance and  $i$  is the image distance.

From the astronomical data we note that

mean distance of the Earth from Sun,  $o = 1.50 \times 10^{11}$  m,  
and the solar equatorial radius,  $R_{sun} = 6.96 \times 10^8$  m.

As the image of the Sun is formed using a thin lens of focal length  $f = 27$  cm, the image distance  $i = 27$  cm.

Therefore, the diameter of the Sun's image as seen on a screen using a thin lens of focal length  $f = 27$  cm will be

$$D_{sun}(image) = 2 \times 6.96 \times 10^8 \times \frac{0.27}{1.50 \times 10^{11}} \text{ m}$$
$$= 2.5 \times 10^{-3} \text{ m} = 2.5 \text{ mm.}$$

