Answer on Question #66423-Physics-Other

A diffraction grating is ruled with 600 lines per millimeter. When monochromatic light falls normally on the grating. The second order diffraction is obtained at an angle of 15 degree with the normal to the grating, what is the frequency?

Solution

The second-order maximum refers to m = 2.

Use the equation for constructive interference to find the wavelength:

$$d \sin \theta = m\lambda$$

$$\lambda = \frac{d \sin \theta}{m}$$

The frequency is

$$f = \frac{c}{\lambda} = \frac{mc}{d \sin \theta} = \frac{2(3 \cdot 10^8)(6 \cdot 10^5)}{\sin 15} = 1.4 \cdot 10^{15} Hz.$$