

Custom Problem #27:

A double slit of slit separation 0.5 mm is illuminated by a parallel beam from a helium-neon laser that emits monochromatic light of wavelength 6328 \AA . Five meters beyond the slits is a screen. What is the separation of interference fringes on the screen?

Custom Problem #28:

- (a) A diffraction-limited laser beam of diameter 1 cm is pointed at the moon. What is the diameter of the area illuminated on the moon? (The moon is 240,000 miles away.) Take the light wavelength to be 6328 \AA . Neglect scattering from the earth's atmosphere.
- (b) Sound of frequency 2000 Hz falls at normal incidence on a high wall in which there is a vertical gap, 18 in. wide. A man is walking parallel to the wall at a distance of 50 ft. from it on the far side. Over what range of distance would he hear an intensity of sound more than 50% of the maximum value? More than 5%?

Custom Problem #29:

A plane slab of glass of thickness T and index of refraction n is inserted between an observer's eye and a point source. Show that the point source appears to be displaced to a point closer to the observer by approximately $[(n-1)/n]T$. Use small-angle approximations.