



# Problems on chapters 16 and 17

## Problem 1.

“Gaussian beam transmission through a square aperture”

Chapter 17.1, page 637 in Siegman book.

Additionally, make a plot of power transmission vs  $2a/w$ ,  $w$  – beam spot size

## Problem 2.

A laser pointer with wavelength  $\lambda = 670$  nm is projected on a screen. The beam reaching the screen has a spot of diameter 2mm and a total power of the light reaching the screen is  $P = 3$  mW. We then put a lens with a focal length  $f_1 = 1$  cm before the screen.

1. If the radius of curvature of the wavefront reaching the lens is 2 m, find the waist of the focused light.
2. The intensity of the light at the center of the beam is given by  $I_{\max} = \frac{2P}{\pi w_0^2}$  [W/m<sup>2</sup>]. Calculate the maximum intensity at the focal point.
3. If we place a second lens with  $f_2 = 10$  cm after the first one at a distance  $d = f_1 + f_2$ :
  - (a) Calculate the beam spot of the beam at the second lens;
  - (b) What application do you see for such a system of lenses?

Consider thin lenses