Assignment 7

Due on 2023-05-15, 23:59 IST.

1. Which among the following terms appear in the equation for a Gaussian beam? 1 point
   \[ \frac{1}{r^2} \]
   \[ \frac{r^2}{z^2} \]
   \[ \frac{1}{(z^2 + r^2)^2} \]
   \[ \frac{1}{(z^2 - r^2)^2} \]

2. At which point along the direction of propagation of a Gaussian beam is the intensity of the beam maximum? 1 point
   \[ y = 0 \]
   \[ z = 2z_0 \]
   \[ z = z_0 \]

3. What is the radius of curvature of the beam at this point? 1 point
   \[ A = 0 \]
   \[ A > 0 \]
   \[ A < 0 \]
   \[ A = 2z_0 \]

4. Through what distance does the radius of curvature of the beam change from the waist to the far-field limit? 1 point

5. At the far-field limit, the radius of curvature of the Gaussian beam

   \[ A = 2z_0 \]
   \[ A = 0 \]
   \[ A = 2z_0 \]
   \[ A = 2z_0^2 \]

6. An optical setup is rotating at 1 rad/s. The disk radius is 0.5 m. The distance to the mirror is 5 m. Assuming the setup is

   \[ A = 2z_0 \]
   \[ A = 0 \]
   \[ A = 2z_0 \]
   \[ A = 2z_0^2 \]

7. A Gaussian beam, if it is 0.5 m, has a small divergence angle of 0.5 m. Then the Rayleigh range is

   \[ A = 2z_0 \]
   \[ A = 0 \]
   \[ A = 2z_0 \]
   \[ A = 2z_0^2 \]

8. The grating is located to the right of the beam. The incident light is in the x-direction. The grating is located to the right of the beam.

   \[ A = 2z_0 \]
   \[ A = 0 \]
   \[ A = 2z_0 \]
   \[ A = 2z_0^2 \]

Design the following system in OSLO and answer questions 9 to 10

Lou has a sailboat for Expo. Max height = 10. Design OSLO, to have total length of 50 m and sail to be of 200 m². Let the roll of the sailboat be 45°. Place the second bow 40 m away from the sailboat. Adjust the bow length of the bow made that \( \phi \leq 60° \).