Problem 9.27 A 94-GHz automobile collision-avoidance radar uses a rectangular-aperture antenna placed above the car's bumper. If the antenna is 1 m in length and 10 cm in height,

(a) what are its elevation and azimuth beamwidths?

Solution:

(a) At 94 GHz, $\lambda = 3 \times 10^8/(94 \times 10^9) = 3.2$ mm. The elevation beamwidth is $\beta_e = \lambda/0.1\text{ m} = 3.2 \times 10^{-2}$ rad $= 1.8^\circ$. The azimuth beamwidth is $\beta_a = \lambda/1\text{ m} = 3.2 \times 10^{-3}$ rad $= 0.18^\circ$.