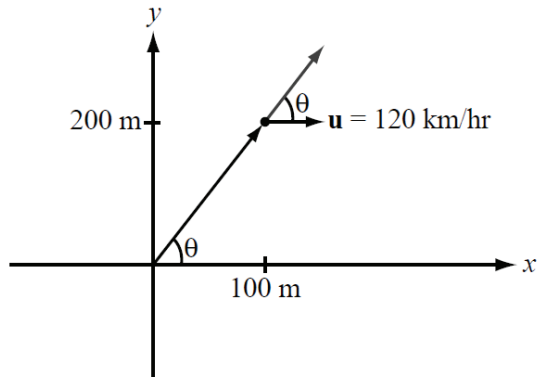


**10.8** A 3-cm-wavelength radar is located at the origin of an  $x$ - $y$  coordinate system. A car located at  $x = 100$  m and  $y = 200$  m is heading east ( $x$ -direction) at a speed of 120 km/hr. What is the Doppler frequency measured by the radar?

**Solution:**



**Figure P10.8** Geometry of Problem 10.8.

$$\theta = \tan^{-1} \left( \frac{200}{100} \right) = 63.43^\circ,$$

$$u = 120 \text{ km/hr} = \frac{1.2 \times 10^5}{3600} = 33.33 \text{ m/s},$$

$$f_d = \frac{-2u}{\lambda} \cos \theta = \frac{-2 \times 33.33}{3 \times 10^{-2}} \cos 63.43^\circ = -993.88 \text{ Hz}.$$