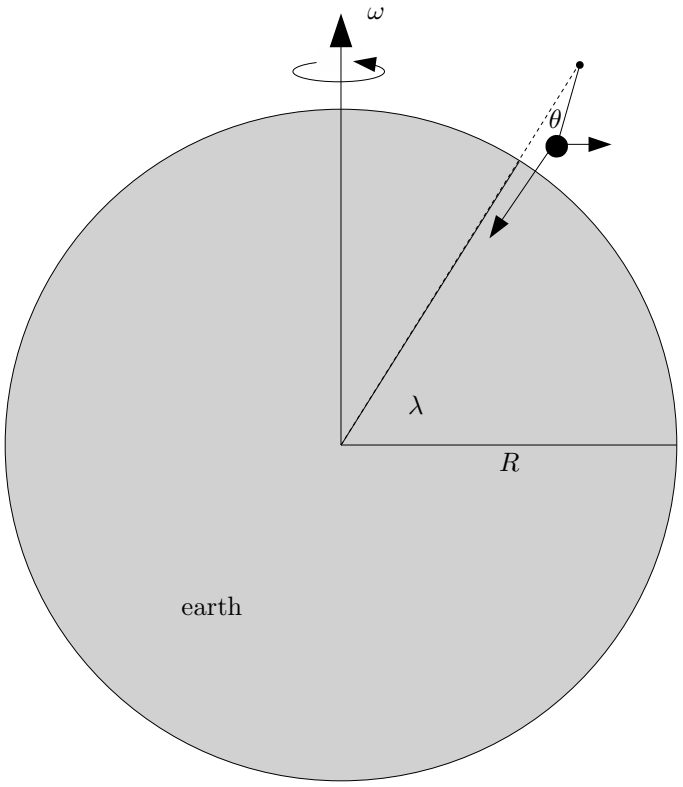
1 Small Angular Deviation from True Vertical



1.1 General Angular Deviation from True Vertical

Show that the small angular deflection of a plumb line from a radially vertical line is approximately

$$\theta \approx \frac{R\omega^2 \sin\lambda \cos\lambda}{g - R\omega^2 \cos^2\lambda} \tag{1.1}$$

where R is the radius of the earth, ω is the angular frequency of rotation of the earth, g is the acceleration due to gravity at the surface of the earth, and λ is the angle of latitude (which is zero at the equator).

1.2 Maximum Angular Deviation from True Vertical

What is the maximum deflection of a plumb line measured in degrees? (Maximize by varying λ.) Use $R = 6.4 \times 10^6$m and $g = 9.8\text{m/s}^2$. Hint: Keep in mind what numbers are small.