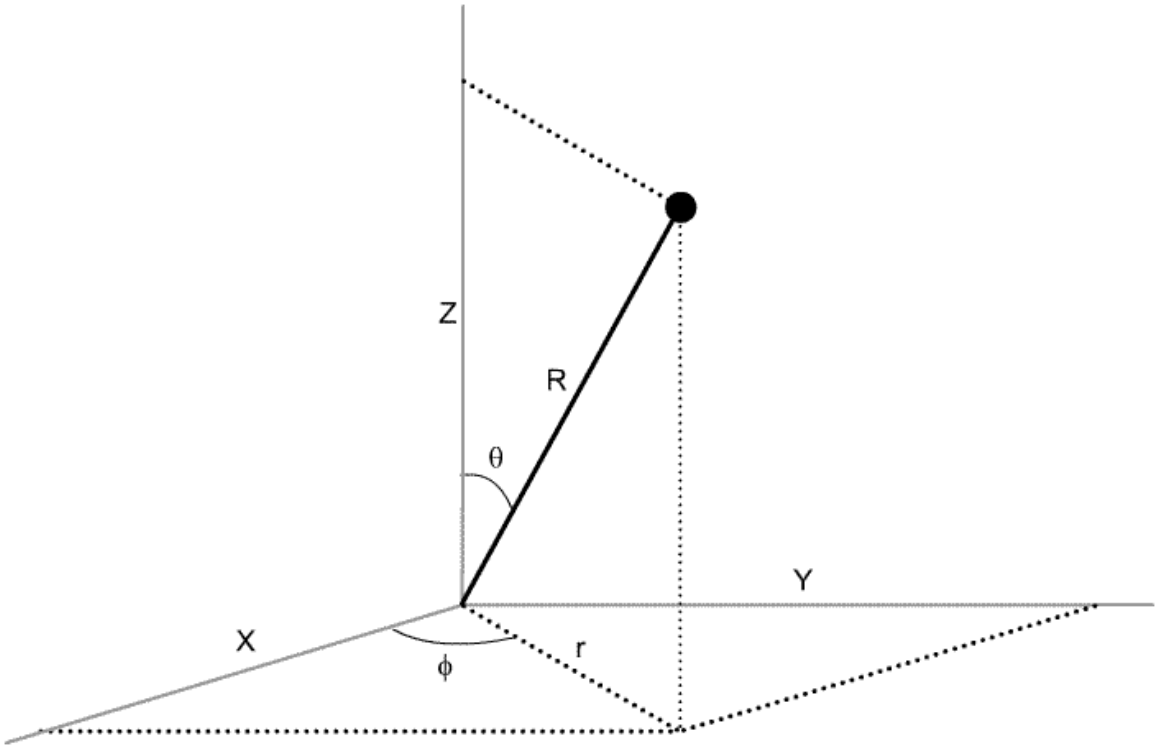

Cartesian to Cylindrical

$r = \sqrt{X^2 + Y^2}$

$\phi = \tan^{-1}(Y / X)$

$Z = Z$

Cylindrical to Cartesian

$X = r \cos \phi$

$Y = r \sin \phi$

$Z = Z$

Cartesian to Spherical

$R = \sqrt{X^2 + Y^2 + Z^2}$

$\phi = \tan^{-1}(Y / X)$

$\theta = \tan^{-1}(r / Z) = \cos^{-1}(Z / R)$

Spherical to Cartesian

$X = R \sin \theta \cos \phi \ \ (= r \cos \phi)$

$Y = R \sin \theta \sin \phi \ \ (= r \sin \phi)$

$Z = R \cos \phi$

Cylindrical to Spherical

$R = \sqrt{r^2 + Z^2}$

$\phi = \phi$

$\theta = \tan^{-1}(r / Z) = \cos^{-1}(Z / R)$

Spherical to Cylindrical

$r = R \sin \theta$

$\phi = \phi$

$Z = R \cos \theta$