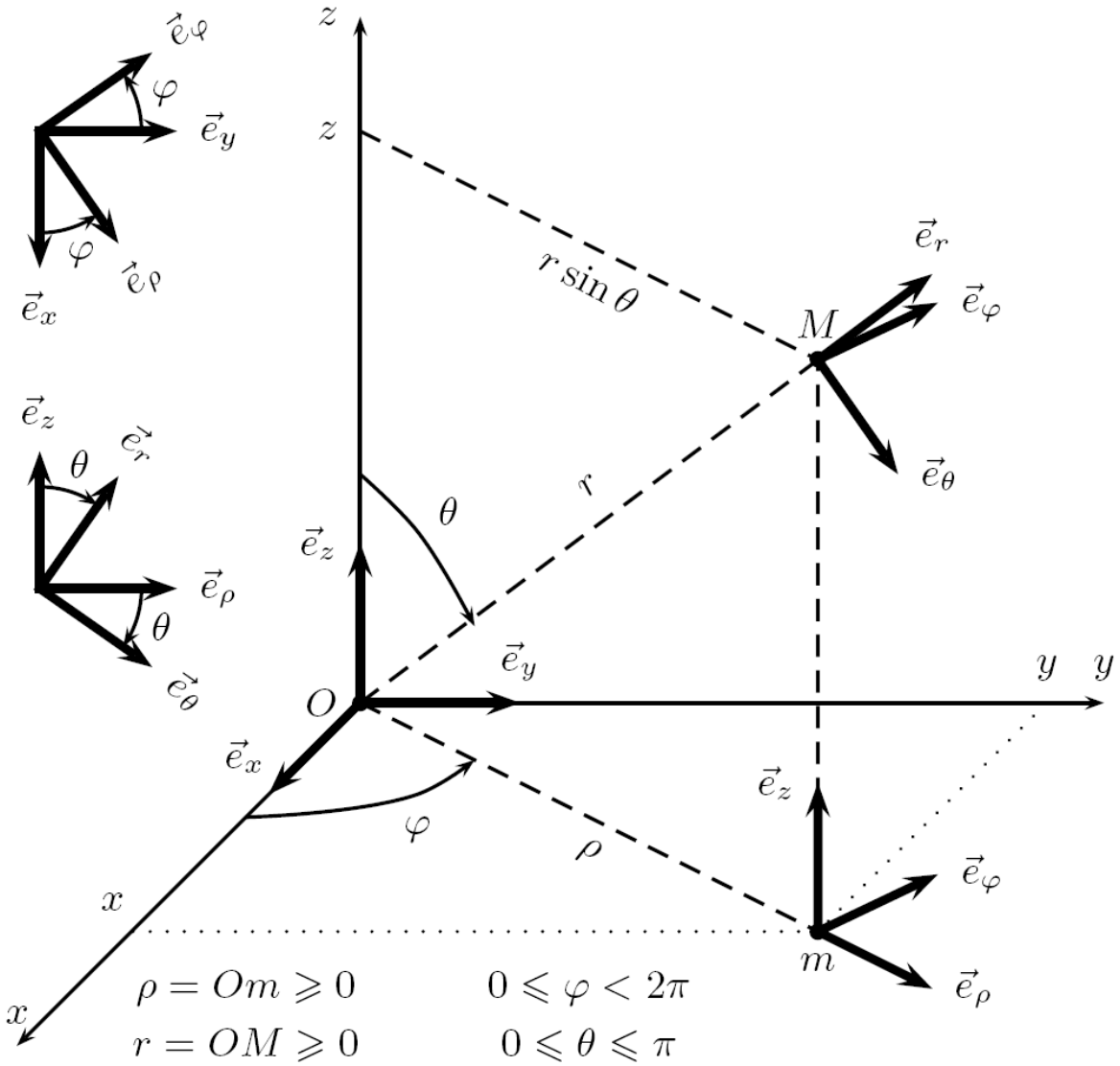
Systèmes de coordonnées orthogonaux



$\rho = Om \geqslant 0 \qquad 0 \leqslant \varphi < 2\pi$

$r = OM \geqslant 0 \qquad 0 \leqslant \theta \leqslant \pi$

$\vec{e}_\rho = \vec{e}_x \cos\varphi + \vec{e}_y \sin\varphi,\ \vec{e}_\varphi = -\vec{e}_x \sin\varphi + \vec{e}_y \cos\varphi$

$\vec{e}_r = \vec{e}_z \cos\theta + \vec{e}_\rho \sin\theta,\ \vec{e}_\theta = -\vec{e}_z \sin\theta + \vec{e}_\rho \cos\theta$

$x = \rho\cos\varphi,\ y = \rho\sin\varphi,\ z = r\cos\theta,\ \rho = r\sin\theta$

$\mathrm{d}\vec{r} = \mathrm{d}x\vec{e}_x + \mathrm{d}y\vec{e}_y + \mathrm{d}z\vec{e}_z\ ;\ \mathrm{d}\tau = \mathrm{d}x \times \mathrm{d}y \times \mathrm{d}z$

$\mathrm{d}\vec{r} = \mathrm{d}\rho\vec{e}_\rho + \rho\mathrm{d}\varphi\vec{e}_\varphi + \mathrm{d}z\vec{e}_z\ ;\ \mathrm{d}\tau = \rho\,\mathrm{d}\rho \times \mathrm{d}\varphi \times \mathrm{d}z$

$\mathrm{d}\vec{r} = \mathrm{d}r\vec{e}_r + r\mathrm{d}\theta\vec{e}_\theta + r\sin\theta\mathrm{d}\varphi\vec{e}_\varphi\ ;\ \mathrm{d}\tau = r^2\,\mathrm{d}r \times \sin\theta\,\mathrm{d}\theta \times \mathrm{d}\varphi$