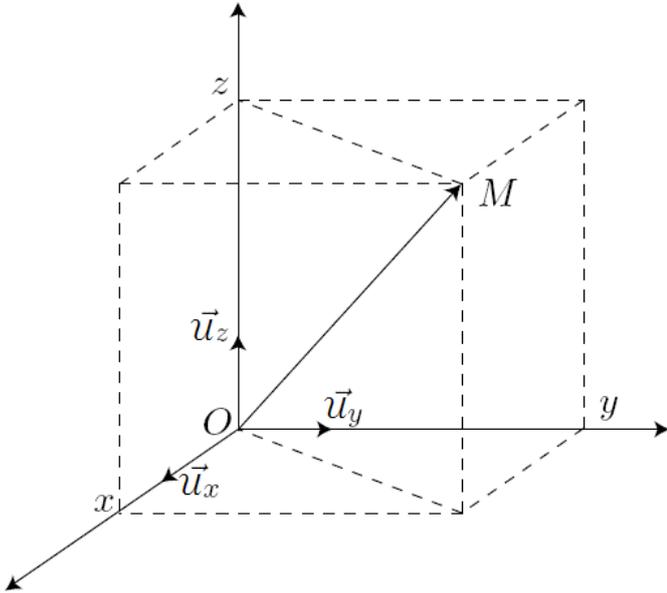
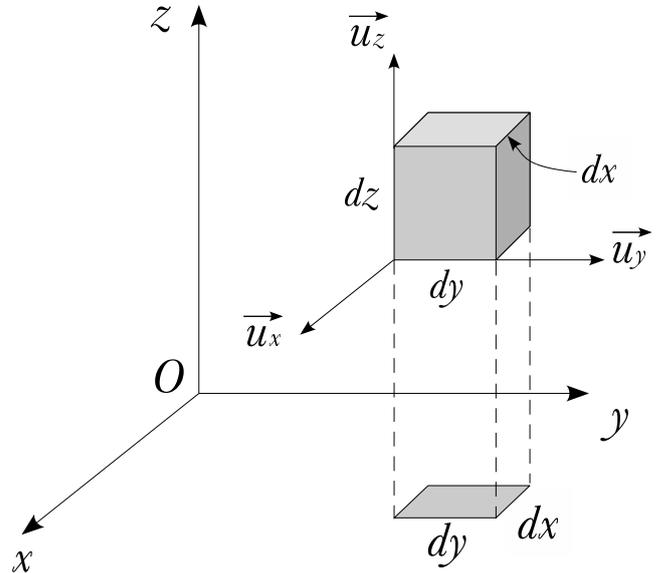


Systèmes de coordonnées

1 Coordonnées cartésiennes

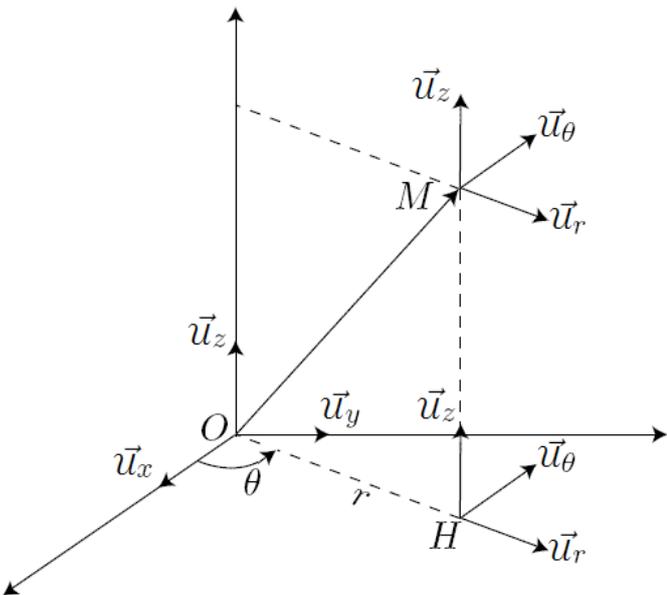


position : $\vec{r} = x\vec{u}_x + y\vec{u}_y + z\vec{u}_z$
 vitesse : $\vec{v} = \dot{x}\vec{u}_x + \dot{y}\vec{u}_y + \dot{z}\vec{u}_z$
 accélération : $\vec{a} = \ddot{x}\vec{u}_x + \ddot{y}\vec{u}_y + \ddot{z}\vec{u}_z$

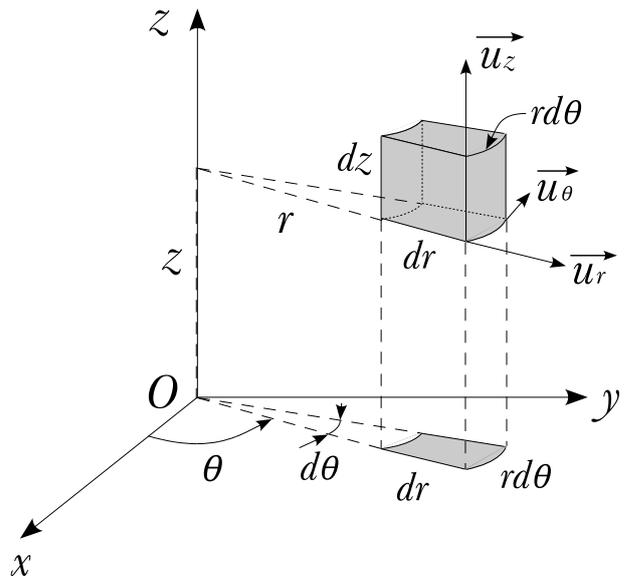


déplacement élémentaire : $d\vec{r} = dx\vec{u}_x + dy\vec{u}_y + dz\vec{u}_z$
 élément de volume : $dV = dx dy dz$

2 Coordonnées cylindriques

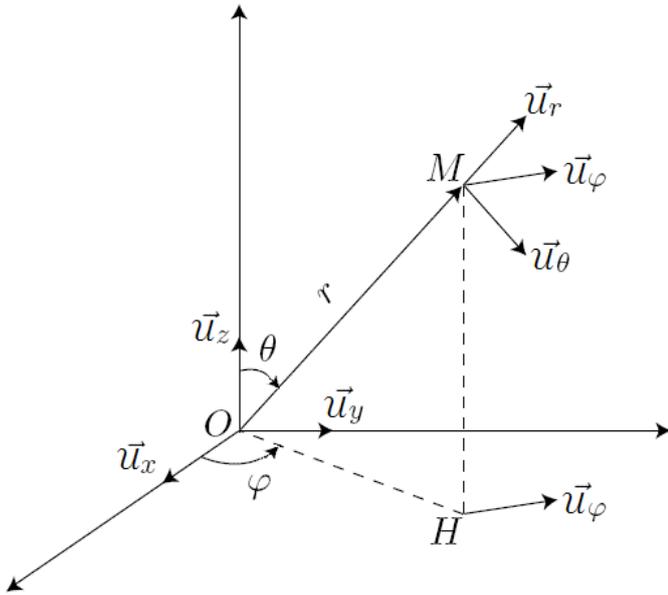


position : $\vec{r} = r\vec{u}_r + z\vec{u}_z$
 vitesse : $\vec{v} = \dot{r}\vec{u}_r + r\dot{\theta}\vec{u}_\theta + \dot{z}\vec{u}_z$
 accélération : $\vec{a} = (\ddot{r} - r\dot{\theta}^2)\vec{u}_r + (r\ddot{\theta} + 2\dot{r}\dot{\theta})\vec{u}_\theta + \ddot{z}\vec{u}_z$

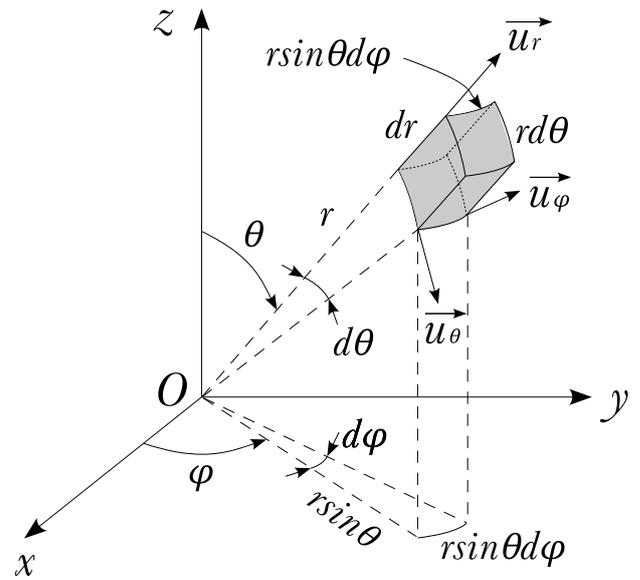


déplacement élémentaire : $d\vec{r} = dr\vec{u}_r + r d\theta\vec{u}_\theta + dz\vec{u}_z$
 élément de volume : $dV = r dr d\theta dz$

3 Coordonnées sphériques



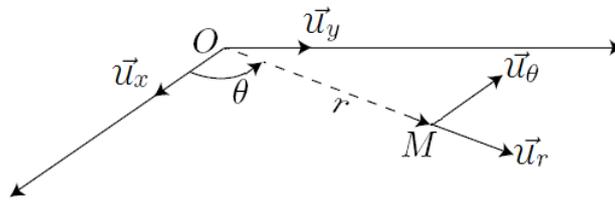
position : $\vec{r} = r \vec{u}_r$



déplacement élémentaire : $d\vec{r} = dr \vec{u}_r + r d\theta \vec{u}_\theta + r \sin\theta d\phi \vec{u}_\phi$

élément de volume : $dV = r^2 \sin\theta dr d\theta d\phi$

4 Coordonnées polaires



position : $\vec{r} = r \vec{u}_r$

vitesse : $\vec{v} = \dot{r} \vec{u}_r + r\dot{\theta} \vec{u}_\theta$

accélération : $\vec{a} = (\ddot{r} - r\dot{\theta}^2) \vec{u}_r + (r\ddot{\theta} + 2\dot{r}\dot{\theta}) \vec{u}_\theta$