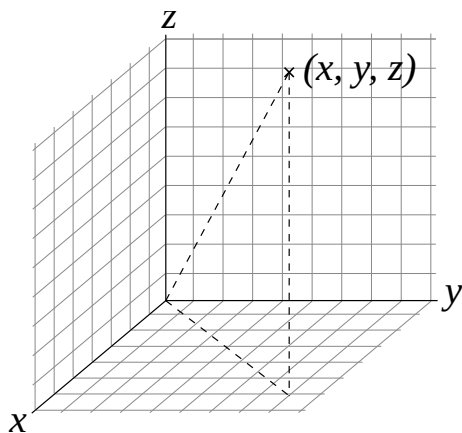




دستگاه‌های مختصات

دستگاه مختصات کارتزین (دکارتی)



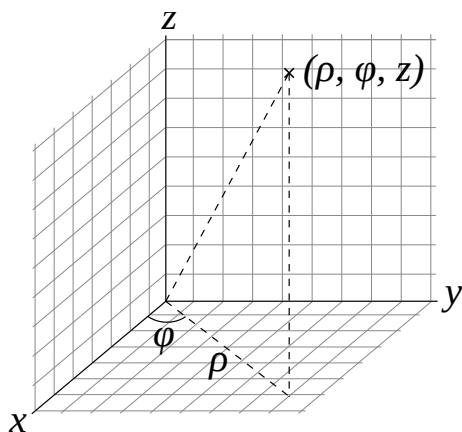
$$(x, y, z) - (\hat{i}, \hat{j}, \hat{k}) - (dx, dy, dz)$$

$$dl_x = dx, \quad dl_y = dy, \quad dl_z = dz$$

$$dS_x = dy dz, \quad dS_y = dx dz, \quad dS_z = dx dy$$

$$dV = dx dy dz$$

دستگاه مختصات استوانه‌ای



$$(\rho, \varphi, z) - (\hat{\rho}, \hat{\varphi}, \hat{k}) - (d\rho, \rho d\varphi, dz)$$

$$dl_\rho = d\rho, \quad dl_\varphi = \rho d\varphi, \quad dl_z = dz$$

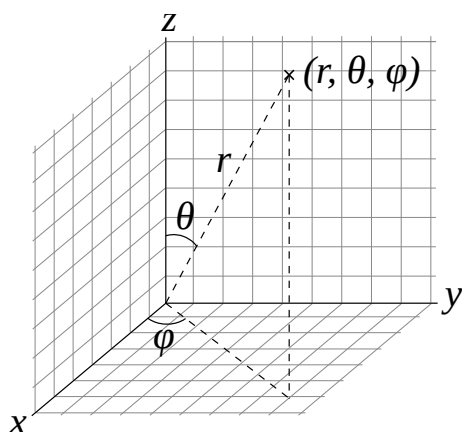
$$dS_\rho = \rho d\varphi dz, \quad dS_\varphi = d\rho dz, \quad dS_z = \rho d\rho d\varphi$$

$$dV = \rho d\rho d\varphi dz$$

$$\rho = \sqrt{x^2 + y^2}, \quad \varphi = \tan^{-1}(y/x), \quad z = z$$

$$x = \rho \cos\varphi, \quad y = \rho \sin\varphi, \quad z = z$$

دستگاه مختصات کروی



$$(r, \theta, \varphi) - (\hat{r}, \hat{\theta}, \hat{\varphi}) - (dr, r d\theta, r \sin\theta d\varphi)$$

$$dl_r = dr, \quad dl_\theta = r d\theta, \quad dl_\varphi = r \sin\theta d\varphi$$

$$dS_r = r^2 \sin\theta d\theta d\varphi, \quad dS_\theta = r \sin\theta dr d\varphi, \quad dS_\varphi = \rho dr d\theta$$

$$dV = r^2 \sin\theta dr d\theta d\varphi$$

$$r = \sqrt{x^2 + y^2 + z^2}, \quad \theta = \tan^{-1}(z/r), \quad \varphi = \tan^{-1}(y/x)$$

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