si ottiene

$$I = \iiint_D 4z\,dx\,dy\,dz - \iint_{\Sigma_1} \vec{F}\cdot(-1,0,0)\,dy\,dz +$$

$$- \iint_{\Sigma_2} \vec{F}\cdot(0,-1,0)\,dx\,dz - \iint_{\Sigma_3} \vec{F}\cdot(0,0,-1)\,dy\,dz .$$

D'altra parte, si ha

$(xyz)\in\Sigma_1 \Rightarrow \vec{F}(xyz)\cdot(-1,0,0) = 0$
$(xyz)\in\Sigma_2 \Rightarrow \vec{F}(xyz)\cdot(0,-1,0) = 0$
$(xyz)\in\Sigma_3 \Rightarrow \vec{F}(xyz)\cdot(0,0,-1) = 0$

e quindi

$$I = \iiint_D 4z\,dx\,dy\,dz = \iint_{D' := \{(xy)\in[0,+\infty)^2 :\ 4x^2+y^2\le 4\}} dx\,dy \int_0^{\sqrt{4-4x^2-y^2}} 4z\,dz$$

$$= 2\iint_{D'} (4-4x^2-y^2)\,dx\,dy \underset{\begin{cases} x=\rho\cos\theta \\ y=2\rho\,\mathrm{sen}\,\theta \end{cases}}{=} 4\int_0^{2\pi} d\theta \int_0^1 (4-4\rho^2)\,\rho\,d\rho$$

$$= 32\pi \int_0^1 (\rho-\rho^3)\,d\rho = 32\pi\left(\frac{1}{2}-\frac{1}{4}\right) = 8\pi .$$