الجمهورية الجزائرية الديمقراطية الشعبية
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وزارة التعليم العالي والبحث العلمي
جامعة محمد بوضياف بالمسيلة
كلية التكنولوجيا
قسم الهندسة الميكانيكية

Corrigé type –Mécanique analytique - L3- Construction Mécanique-S5-2020/2021

Exercice N°1

$I_{oz} = \int_0^R \int_0^{-\frac{H}{R}y+H} \sigma r^2 ds$……..(1.5)

$I_{oz} = \int_0^R \int_0^{-\frac{H}{R}y+H} \sigma (y^2 + x^2) dydz$……..(1.5)

$I_{oz} = \int_0^R \int_0^{-\frac{H}{R}y+H} \sigma y^2 dydz$……..(1)

$I_{oz} = \sigma \int_0^R y^2 \left(-\frac{H}{R}y + H\right) dy$……..(1.5)

$I_{oz} = \sigma \left[-\frac{H}{4R}y^4 + \frac{Hy^3}{3}\right]_0^R$……..(1.5)

$I_{oz} = \sigma \left[-\frac{H}{4R}R^4 + \frac{HR^3}{3}\right]$……..(1)

$I_{oz} = \sigma \frac{HR^3}{12} = \frac{mR^2}{12}$……..(2)

Exercice N°2

Energie cinétique

$E_c = \frac{1}{2}m\dot{x}^2$……..(2)

Energie potentielle

$E_{pe} = \frac{1}{2}k_1x^2 + \frac{1}{2}k_2x^2$……(2)

La fonction de Lagrange L et la fonction de Hamilton respectivement

$\begin{pmatrix} L = E_c - E_{pe} = \frac{1}{2}m\dot{x}^2 - \frac{1}{2}k_1x^2 - \frac{1}{2}k_2x^2 \\ H = E_c + E_{pe} = \frac{1}{2}m\dot{x}^2 + \frac{1}{2}k_1x^2 + \frac{1}{2}k_2x^2 \end{pmatrix}$……(2)

$\begin{pmatrix} \frac{d}{dt}\left(\frac{\partial L}{\partial \dot{x}}\right) - \frac{\partial L}{\partial x} = 0 \\ \frac{dH}{dt} = 0 \end{pmatrix}$……(2)

L'équation horaire sous forme différentielle

$m\ddot{x} + (k_1 + k_2)x = 0$……(2)