

TP1 Frequences Propre de Vibration Plat Rectangulaire

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In [2]: import numpy as np
```

```
In [61]: # On utilise un approximation de Ritz donne par William Stoker  
# la reference "Shock and Vibration Handbook"  
# c.f. https://perso.univ-rennes1.fr/lalaonirina.rakotomanana-
```

```
def freevibfreq(given):  
    # Modes de vibrations d'une plaque carree de dimensions proches a notr  
    # Parametres:  
    # E = Module de Young  
    # rho = masse volumique  
    # nu = coefficient de Poisson  
    # h = epaisseur, a = longueur moyenne  $\{(l+w)/2\}$  de notre plaque  
  
    h = 0.008  
    a = 0.27  
    E = float(75*10**9)  
    rho = 2786  
    nu = 0.3  
  
    # On calcule les frequences des 5 premiers modes de vibrations de  
  
    d = E*(h**3)/(12.*(1-(0.3)**2)) #stiffness  
    denom = np.sqrt(d/(rho*h*a**4))  
    w = given*denom  
    f = w/(2*np.pi)  
    print f
```

```
In [54]: # Ici on fait calcul des premiers modes de vibration de la plaque carree.
```

```
freevibfreq(13.489), freevibfreq(19.789), freevibfreq(24.432), freevibfreq(35
```

```
369.905766349  
542.669227539  
669.993156159  
960.455153132
```

1687.21344654

Out [54]: (None, None, None, None, None)

In [72]: *# On calcul les frequences naturelles pour le modele DDL du systeme plaque*

```
def vib2ddl(a,k,rho,l,w,h):  
  
    # déplacements caracteristiques, z1 & z2, pour les deux modes principaux  
  
    z1 = a/2 - np.sqrt(1+(a/2)**2)  
    z2 = a/2 + np.sqrt(1+(a/2)**2)  
  
    print z1, z2  
  
    m = rho*l*w*h  
  
    # frequences naturels des modes principaux  
  
    w1 = np.sqrt(k/(2*m)*((2+a)+np.sqrt(4+a**2)))  
    w2 = np.sqrt(k/(2*m)*((2+a)-np.sqrt(4+a**2)))  
  
    print w1, w2
```

In [73]: vib2ddl(0.003,75*10**9,2786,0.29,0.25,0.008)

-0.998501124999 1.001501125
304792.304889 8340.82072982

In []: