TP1 Fre?quences Propre de Vibration Plat Rectangulaire

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In [2]: import numpy as np
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In [61]:         #     On utilise un approximation de Ritz donne par William Stokey
                 #     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 = longuer 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
```

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369.905766349
542.669227539
669.993156159
960.455153132
```

```
1687.21344654
```

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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):

             # deplacements characteristiques, z1 & z2, pour les deux modes princip

             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 pricipaux

             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)
```

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-0.998501124999 1.001501125
304792.304889 8340.82072982
```

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In [ ]:
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