

```

0  ### -*- coding: cp1252 -*-
1  """
2  Calcul de la figure de diffraction d'une onde plane sous une
3  incidente theta0 par une fente de largeur a dans le cadre de la diffraction
4  de Fresnel.
5  Comparaison avec la diffraction de Fraunhofer
6  """
7  from __future__ import division
8  from pylab import *
9  from scipy import *
10 from scipy.integrate import quad
11
12 def Ad_cos(X, alpha, D0):
13     phi = pi*D0/lamb*((alpha-X/D0)**2+2*X*theta0/D0)
14     return cos(phi)
15
16 def Ad_sin(X, alpha, D0):
17     phi = pi*D0/lamb*((alpha-X/D0)**2+2*X*theta0/D0)
18     return sin(phi)
19
20 def J(alpha, a, D0):
21     AmpReal = quad(Ad_cos, -a/2, a/2, args=(alpha, D0))[0]
22     AmpIm = quad(Ad_sin, -a/2, a/2, args=(alpha, D0))[0]
23     return (AmpReal**2+AmpIm**2)/a**2
24
25 J_vec = vectorize(J)
26
27 def JFr(alpha, a):
28     u = pi*alpha*a/lamb
29     Amp_tot = sin(u)/u
30     return Amp_tot**2
31
32 D0 = 0.1
33 lamb = 500.e-9
34 theta0 = 0.
35 a = 0.0005
36
37 alphaM = 0.005
38 alpha = linspace(-alphaM, alphaM, 500)
39 plot(alpha, J_vec(alpha, a, 0.1), 'g', label='D = 10 cm', linewidth=2)
40 plot(alpha, J_vec(alpha, a, 0.2), 'b', label='D = 20 cm', linewidth=2)
41 plot(alpha, J_vec(alpha, a, 0.5), 'r', label='D = 1 m', linewidth=2)
42
43 plot(alpha, JFr(alpha, a), 'black', label='D = $\infty$', linewidth=2)
44
45 axis([-alphaM, alphaM, 0, 1.1])
46 xlabel(r'$\alpha$', size=18)
47 legend()
48 show()

```

