nov_09_coding_prob

November 15, 2023

[ ]:
```
import matplotlib.pyplot as plt
import numpy as np

theta = np.linspace(0, 2*np.pi, 100000)

sigma = (100000*np.cos(theta)**2)/(np.pi * (0.01**2))

tau =  (100000*np.sin(theta)**2)/ (np.pi * (0.01**2))


plt.scatter(0, sigma.max(), color = "black", label = "sigma max")
plt.scatter(np.pi, sigma.max(), color = "black")
plt.scatter(2*np.pi, sigma.max(), color = "black")

print("0, pi, and 2 pi are the angles of the principal planes of sigma; they␣
 ↪have a normal stress of " , sigma.max() , " and a shear stress of 0. The␣
 ↪plots of shear stress and normal stress are opposites of one another.")

plt.scatter(np.pi/2, tau.max(), color = "green", label = "tau max")
plt.scatter(3*np.pi/2, tau.max(), color = "green")
plt.scatter(np.pi, tau.min(), color = "blue", label = "tau min")

print("Pi/2 and 3*pi/2 are where the maximums of tau occur; they have a normal␣
 ↪stress of 0 and a shear stress of ", tau.max() ,".Pi is where tau has a␣
 ↪minimum; the shear stress at that point is 0 and the normal stress is ",␣
 ↪sigma.max(), " The plots of shear stress and normal stress are opposites of␣
 ↪one another.")



plt.plot(theta, sigma, label = "normal stress")
plt.plot(theta, tau, label = "shear stress")

plt.xlabel("theta (radians)")
plt.ylabel("force (pascals)")
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plt.title("plot of normal and shear stress")

plt.legend()
plt.show()
```

0, pi, and 2 pi are the angles of the principal planes of sigma; they have a normal stress of 318309886.1837907 and a shear stress of 0. The plots of shear stress and normal stress are opposites of one another.
Pi/2 and 3*pi/2 are where the maximums of tau occur; they have a normal stress of 0 and a shear stress of 318309886.1052493 .Pi is where tau has a minimum; the shear stress at that point is 0 and the normal stress is 318309886.1837907
The plots of shear stress and normal stress are opposites of one another.