File - C:\Users\geoff\Desktop\FlyOx Concept\Python\engines\tail.py

```
 1
 2 # coding: utf-8
 3 __author__ = 'Geoffrey Nyaga'
 4
 5 import sys
 6 sys.path.append('../')
 7 from API.db_API import write_to_db,read_from_db
 8 from API.wingAPI import wingDimensions
 9
10
11 import numpy as np
12 from math import pi,sqrt
13 import matplotlib.pyplot as plt
14
15
16 Sref =  read_from_db('S')*10.76 #ft^2
17 Cref = read_from_db('meanGeometricChord') #ft   #Shit is confusing, do i use MGC or Cref?????
18 bref = read_from_db('wingSpan')
19
20 VHT = 0.75
21 ConeRadius1 = 1.5 #ft
22 ConeRadius2 = 0.5 #ft
23
24
25 ##DIMENSIONING
26
27 HtailAR = 4
28 HtailTaper = 0.8
29
30 #INITIAL TAIL SIZING CONSIDERING H.TAIL ONLY - GUDMUNDSSON
31
32 #Optimim tail Arm
33 # HtailArm = sqrt ((2*VHT*Sref*Cref)/(pi*(ConeRadius1+ConeRadius2)))
34 # Swet = pi*(ConeRadius1+ConeRadius2)*HtailArm + (2*VHT*Sref*Cref/HtailArm)
35 # print (HtailArm,"ft is the Tail Arm for the VHT input of", VHT,"ft")
36 # print (Swet, "ft^2 is the correponding wetted area")
37
38
39 # # In[57]:
40
41 # HtailArea = ((VHT*Sref*Cref)/HtailArm)
42 # HtailWingspan = sqrt(HtailAR*HtailArea)
43 # HtailCavg = HtailWingspan/HtailAR
44
45
46 # # In[58]:
47
48 # print (HtailArea,"ft^2 Horizontal Tail Area")
49 # print (HtailWingspan,"ft Horizontal Tail wingspan")
50 # print (HtailCavg,"ft Horizontal Tail average chord")
51
52
53 # # In[59]:
54
55 # def SurfaceAreavsTailArm():
56 #         tailArm = np.arange(2,20)#THIS WILL CHANGE FIR DRONES AND COMMERCIAL JETS
57 #         tailArea = (VHT*Sref*Cref/tailArm)
58
59 #         coneArea = np.pi*(ConeRadius1+ConeRadius2)*tailArm
60 #         Swet = coneArea+(2*tailArea)
61
62 #         a= min(Swet)
63 #         b = np.argmin(Swet)
64 #         c = tailArm[b]
65
66
67 #         plt.subplot(2,1,2)
68
69 #         plt.axhline(a)
70 #         plt.axvline(c)
71
72 #         plt.plot(tailArm,tailArea)
73 #         plt.plot(tailArm,coneArea)
74 #         plt.plot(tailArm,Swet)
75
76 #         plt.subplot(2,2,1)
77
```

```
 78 #         vht = np.arange(0.4,1,0.1)
 79 #         for i in vht:
 80 #             tailArea = i*Sref*Cref / tailArm
 81 #             plt.plot(tailArm,tailArea)
 82 #             plt.plot(tailArm,coneArea)
 83 
 84 
 85 #         plt.subplot(2,2,2)
 86 
 87 #         vht = np.arange(0.4,1,0.1)
 88 #         # print("these are the minimum wetted areas on the second graph on the right. More
    visualization coming soon")
 89 #         for i in vht:
 90 #             tailArea = i*Sref*Cref / tailArm
 91 #             Swet1 = np.array(coneArea+(2*tailArea))
 92 #             #a = np.asarray([min(Swet1)])
 93 #             a = (min(Swet1))
 94 
 95 #             # print(a)
 96 #             plt.plot(tailArm,Swet1)
 97 #             #plt.scatter(tailArm,a)
 98 
 99 #         # plt.show()
100 
101 # SurfaceAreavsTailArm()
102 
103 # #INITIAL TAIL SIZING OPTIMIZATION CONSIDERING V.TAIL ONLY - GUDMUNDSSON
104 
105 Vvt = 0.040
106 VtailAR = 1.4
107 VtailTaper = .5
108 
109 
110 # VtailArm = sqrt((Vvt*Sref*bref)/(pi*(ConeRadius1+ConeRadius2)))
111 # print(VtailArm,"ft Optimum V.Tail arm")
112 
113 
114 # if HtailArm >= VtailArm:
115 #     VtailArea = (Vvt * Sref * bref) / HtailArm
116 # else:
117 #     VtailArea = (Vvt * Sref * bref) / VtailArm
118 # print (VtailArea,"ft^2 VTail area")
119 
120 
121 # VtailWingspan = sqrt(VtailAR * VtailArea)
122 # VtailCavg = VtailWingspan/VtailAR
123 
124 # print (VtailWingspan,"ft VTail wingspan")
125 # print (VtailCavg,"ft VTail average chord")
126 
127 #INITIAL TAIL SIZING OPTIMIZATION CONSIDERING H.TAIL and V.TAIL  - GUDMUNDSSON
128 
129 
130 tailArm = sqrt ( (2*Sref*(VHT*Cref + Vvt*bref))/(pi*(ConeRadius1+ConeRadius2)) )
131 Sht = (VHT*Sref*Cref )/ tailArm
132 Svt = (Vvt*Sref*bref )/ tailArm
133 HtailWingspan = sqrt(HtailAR*Sht)
134 VtailWingspan = sqrt(VtailAR * Svt)
135 HtailCavg = HtailWingspan/HtailAR
136 HtailCroot = 2*HtailCavg/(1+HtailTaper)
137 HtailCtip = HtailTaper * HtailCroot
138 VtailCavg = VtailWingspan/VtailAR
139 VtailCroot = 2*VtailCavg/(1+VtailTaper)
140 VtailCtip = VtailTaper * VtailCroot
141 print (tailArm,"tailArm")
142 print (Sht,"Sht")
143 print(Svt,'svt')
144 print(HtailWingspan,"HtailWingspan")
145 print(VtailWingspan,"VtailWingspan")
146 print(HtailCavg,"HtailCavg")
147 print(HtailCroot,"HtailCroot")
148 
149 print(HtailCtip,"HtailCtip")
150 
151 print(VtailCroot,"VtailCroot")
152 print(VtailCtip,"VtailCtip")
153 print(VtailCavg,"VtailCavg")
```

```
154
155 # def combined():
156
157 #     VHT = Sht*lt / (Sref*Cref)
158 #     Vvt = Svt *lt /(Sref*bref)
159
160 #     Sf = pi*(ConeRadius1+ConeRadius2)*lt
161
162 #     Swet = Sf + (2*Sht)+(s*Svt)
```