
Table of Contents

.....	1
Weight -> Lift -> Drag -> Thrust	1
weight	1
Lift	1
Drag	2
Thrust	2
DATA	3

```
clear all
close all
clc
```

Weight -> Lift -> Drag -> Thrust

weight

```
weight = 55*.453592*9.81;%weight 55 lbs in newtons
```

Lift

```
d = 1.225; %kg/m^3 = will be a function of altitude in final flight
calc
CL = 1.2;%Coefficient of lift
Lift = weight;

length = 11*.3048;
SA = 0;
speeds = [5:1:23];

for i = speeds
    vel = i;
    S = ((2*Lift)/(d*vel^2*CL));

    width = (S/length);%*3.28084;
    SA = [SA S];
end

vp = 13;% take off speed m/s

take = ((2*Lift)/(d*vp^2*CL));

plot (speeds,SA(2:end))
hold on
plot(vp,take,'r*')
ylabel('Surface area m^2')
xlabel('Speed m/s')
```

```

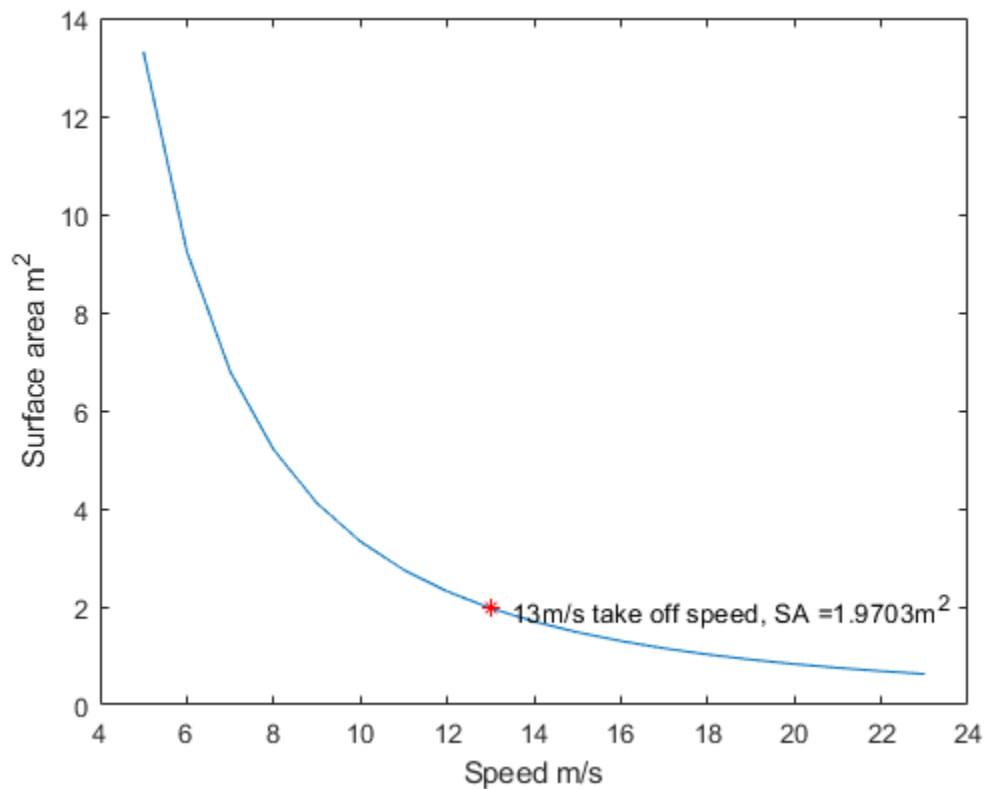
x1 = vp;
y1 = take;
txt1 = [ ' ', num2str(vp) , 'm/s take off speed, SA
        ', num2str(take), 'm^2'];
text(x1,y1,txt1);

surf = take*10.7639
wit = (take*10.7639)/11;%width in feet of wing

surf =

    21.2077

```



Drag

```

V = vp*2.5;
cd = .05; %standard drag coefficient of a plane
Drag = cd*take*0.5*d*V^2;

```

Thrust

```

diam = 12; %prop diameter
pitch = 6; %prop pitch

```

```
RPM = 36000;  
C1 = 4.392399*10^-8;  
C2 = 4.23333*10^-4;  
  
Thrust = C1*RPM*((diam^3.5)/sqrt(pitch))*(C2*RPM*pitch); %source:  
    http://www.electricrcaircraftguy.com/2013/09/propeller-static-dynamic-thrust-equation.html
```

DATA

```
T_ex = Thrust - Drag;%excess thrust  
acc = T_ex/weight%acceleration achievable  
dis = (0.3048*170);  
TOV = sqrt(2*acc*dis)  
time = (2*(dis))/vp;
```

```
acc =
```

```
    1.1834
```

```
TOV =
```

```
    11.0740
```

Published with MATLAB® R2017b