

Anexo I

Código para cálculo de combustible necesario

Código originario [13], modificando los parámetros característicos pertenecientes al *Hercules* C-130:

```
%%%%%%%%%%Fire Retardants-Range%%%%%%%%%%
```

```
clear all
```

```
clc
```

```
W_TO=4608.9438527*2.20462262; %Units from kg to lbs
```

```
W_OE=39008.9438527*2.20462262;%Units from kg to lbs
```

```
max_water_capacity=12485*2.20462262;%Units from kg to lbs
```

```
X=1;
```

```
W_F_used=0;
```

```
W_F_res=0;
```

```
Range=1:1:2050;
```

```
contador=1;
```

```
for (X=1:1:2050)
```

```
%2.4.Determination of mission fuel weight (W_F)
```

```
%From Airplane Desing, Part I, Chapter 2, Table 2.1
```

```
W1_WTO=0.990; %Warmup
```

```
W2_W1=0.990; %Taxi
```

```
W3_W2=0.995; %Take-off
```

```
W4_W3=0.990; %Climb
```

```
%Calculation of W5_W4 (cruise) by means of Breguet's range equation for
```

```
%propeller-driven airplanes
```

```
R_cr=X*0.621371192; %Cruise range from km to miles
```

```
eta_p=0.82;
```

```
c_p=0.33134;
```

```
L_D=15;
```

```
W5_W4=1/exp(R_cr/(375*(eta_p/c_p)*L_D));
```

```
%Calculation of W6_W5 (loiter) by means of Breguet's endurance equation for
```

```
%propeller-driven airplanes
```

```
%E_itr will be considered 300s. Expressed in hours
```

```
E_itr=60*3/3600;
```

```
%V_itr will be 170 knots
```

```

V_ltr=170*1.15077945;
eta_p=0.77;
c_p=0.33134526;
L_D=15;
W6_W5=1/exp(E_ltr/(375*(1/V_ltr)*(eta_p/c_p)*L_D));
W7_W6=0.980; %Descent
%Calculation of W8_W7 (cruise drop water) by means of Breguet's range
%equation for propeller-driven airplanes
R_cr=0.5*0.621371192; %Cruise range from km to miles
eta_p=0.82;
c_p=0.54;
L_D=15;
W8_W7=1/exp(R_cr/(375*(eta_p/c_p)*L_D));
W9_W8=0.990; %Climb empty (no payload).
%Calculation of W10_W9 (cruise empty) by means of Breguet's range equation
%for propeller-driven airplanes
R_cr=X*0.621371192; %Cruise range from km to miles
eta_p=0.82;
c_p=0.33134526;
L_D=15;
W10_W9=1/exp(R_cr/(375*(eta_p/c_p)*L_D));
W11_W10=0.990; %Descent empty.
W12_W11=0.992; %Landing, taxi and shut down
M_ff_1=W1_WTO*W2_W1*W3_W2*W4_W3*W5_W4*W6_W5*W7_W6*W8_W7;
M_ff_2=W9_W8*W10_W9*W11_W10*W12_W11;
%% RESERVE FUEL GENERAL AVIAION CASE (ICAO ANNEXE 6 PART2)
%30min cruising at normal altitude
%Calculation of W25_W24 by means of Breguet's endurance equation for
%propeller-driven airplanes
%E_ltr will be considered 1800s. Expressed in hours
E_ltr=60*30/3600;
V_ltr=336; %Long Range speed at FL100 in mph
eta_p=0.77;
c_p=0.33134526;
L_D=15;
W25_W24=1/exp(E_ltr/(375*(1/V_ltr)*(eta_p/c_p)*L_D));
%% FINAL CALCULUS
if (((W_F_used+W_F_res)/2.20462262)<23587)

```

```

W_PL_new=max_water_capacity;
W_PL_old=0;
while(abs(W_PL_new-W_PL_old)>0.0001)
W_PL_old=W_PL_new;
W_F_used_1=(1-M_ff_1)*W_TO;
W_F_used_2=(1-M_ff_2)*(M_ff_1*W_TO-(W_PL_old));
W_F_used=W_F_used_1+W_F_used_2;
W_F_res=(1-W25_W24)*(W_TO-W_F_used);
W_PL_new=W_TO-W_F_used-W_OE-W_F_res;
end
% TOTAL FUEL
W_F(X)=W_F_used+W_F_res; %Result in lbs
W_PL(X)=W_PL_new; %Result in lbs
contador=contador+1;
else
W_F_used_new=23587*2.20462262;
W_F_res_new=23587*2.20462262;
i=0;
while(((W_F_used_new+W_F_res_new)/2.20462262)>23587)
W_F_used_1=(1-M_ff_1)*W_TO;
W_F_used_2=(1-M_ff_2)*(M_ff_1*W_TO-((W_PL(contador-1)+i)));
W_F_used_new=W_F_used_1+W_F_used_2;
W_F_res_new=(1-W25_W24)*(W_TO-W_F_used);
W_PL_new=W_TO-W_F_used-W_OE-W_F_res;
i=i+1;
end
% TOTAL FUEL
W_F(X)=W_F_used_new+W_F_res_new; %Result in lbs
W_PL(X)=W_PL(contador-1)-i; %Result in lbs
end

```