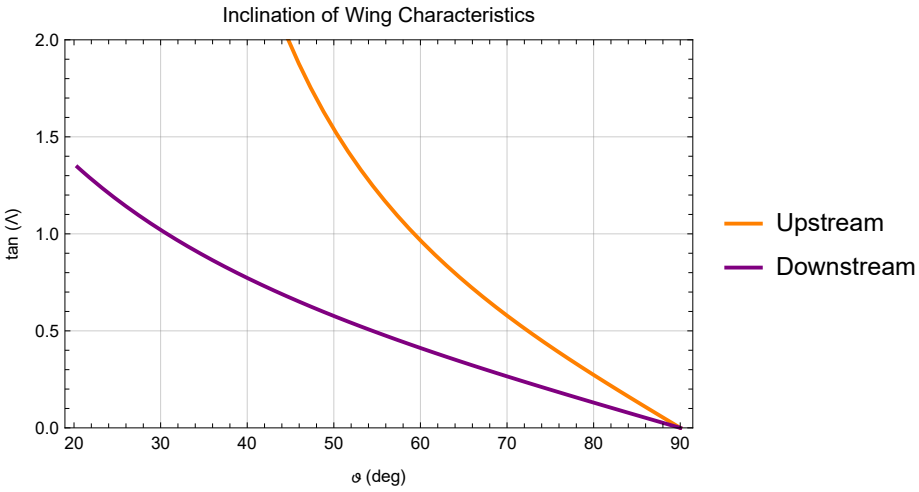
In[ ]:=
```
(*range of values for inclination angle of northern wing*)
RE = 1353 * 10^3;(*moon radius in m*)
B0 = 5.1369 * 10^-9; (*background field magnitude in T*)
B0x = 0;
B0y = 0;
B0z = -B0; (*background magnetic field in system (x,y,z)*)

n0 = 0.11 * 10^6; (*upstream number density in 1/m^3*)
u0 = 43 * 10^3; (*magnitude of upstream flow velocity in m/s*)
u0xcor = u0;
u0ycor = 0;
u0zcor = 0; (*upstream flow velocity in system (xcor,ycor,zcor)*)
E0norm = u0 * B0; (*may be needed for normalization purposes*)
mp = 1.6726231 * 10^-27; (*proton mass*)
m = 7.5 * mp; (*upstream ion mass*)
mu0 = 4 * 3.14159265359 * 10^-7; (*magnetic permeability of vacuum*)

vA = B0 / Sqrt[mu0 * n0 * m]; (*Alfven velocity*)
MA = u0 / vA (*Alfvenic Mach number*)
ThetaN[theta_] = ArcTan[MA Cos[theta] / (1 - MA Sin[theta])] * 360 / (2 π);
ThetaS[theta_] = ArcTan[MA Cos[theta] / (1 + MA Sin[theta])] * 360 / (2 π);
(*inclination angle against B0 for NORTHERN Alfven wing*)
```

Out[ ]= 0.348577

In[ ]:=
```
(*tilt of flow vector in northern and
 southern wing against x axis for fully saturated case*)
flowtiltN[theta_] = Tan[(90 + ThetaN[theta * 2 Pi / 360] - theta) * 2 Pi / 360];
flowtiltS[theta_] = Tan[(90 - ThetaS[theta * 2 Pi / 360] - theta) * 2 Pi / 360];
```

In[•]:=
```
Plot4 = Plot[{flowtiltN[theta], flowtiltS[theta]}, {theta, ArcSin[MA] * 360/(2 π), 90},
  FrameLabel → {"ϑ (deg)", "tan (Λ)"}, GridLines → Automatic,
  Frame → True, PlotLabel → "Inclination of Wing Characteristics",
  PlotStyle → {{Orange, Thick}, {Purple, Thick}},
  PlotLegends → {"Upstream", "Downstream"}, PlotRange → {0, 2}]
```

Out[•]=



In[•]:=
```
Export["figure4.pdf", Plot4]
```

Out[•]=
```
figure4.pdf
```