```
function [power, powerReserve] = PowerRequiredPropFunc(V, height, plotVal)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%
% Author: Hudson Reynolds, Preston Wright
% Description: function that finds power for prop aircraft based on the
% velocity
%
% Inputs:
% V - velocity [m/s]
%
% Outputs:
% thrust - the required thrust to maintain SLUF conditions [N]
% thrustReserve - the percentage of thrust remaining [N]
% plots - see outputs
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%

% included so script doesn't throw errors when publishing. Delete these to
% run it as a function
height = 0;
V = 50:1:175;
plotVal = 1;

[~, ~, ~, rho0] = atmosisa(0);     % density of air at sea level [kg/m^3]
[~, ~, ~, rho] = atmosisa(height); % density of air [kg/m^3]
A = 16.3;                          %wing area [m^2]
W = 1315;                          % weight [kg]
cL0 = 0.02;                        % zero AoA cL
cLa = 0.12;                        % slope of cL / alpha
cD0 = 0.026;                       % zero AoA cD
cDa = 0.054;                       % induced drag coefficient
p0max = 216;                       % sea level power [kW]
eta = 0.8;                         % propeller efficiency


[~, lift, drag] = LiftDragFunc(A, rho, cL0, cLa, cD0, cDa, V, W);

power = drag .* V;

powerMax = eta * (rho / rho0)^0.6 * p0max;

powerReserve = 1 - (power / powerMax);


if plotVal == 1
    close all

    hfig = figure;  % save the figure handle in a variable
    fname = 'Power v. Velocity Graph';

    hold on
```

```
    plot(V, power / 1e3)
    title("Velocity v. Power")
    xlabel("Velocity [m/s]")
    ylabel("Power [kW]")



    picturewidth = 20; % set the width of image in cm
    hw_ratio = .6; % aspect ratio
    set(findall(hfig,'-property','FontSize'),'FontSize',16) % adjust font
size


    grid on

    set(findall(hfig,'-property','Box'),'Box','off') % turn off box
    set(findall(hfig,'-property','Interpreter'),'Interpreter','latex')
    set(findall(hfig,'-
property','TickLabelInterpreter'),'TickLabelInterpreter','latex')

    set(hfig,'Units','centimeters','Position',[3 3 picturewidth
hw_ratio*picturewidth])
    pos = get(hfig,'Position');

set(hfig,'PaperPositionMode','Auto','PaperUnits','centimeters','PaperSize',
[pos(3), pos(4)])
    %print(hfig,fname,'-dpdf','-vector','-fillpage')

    print(hfig,fname,'-dpng','-r300')
end


ans =

   1.0e+06 *

  Columns 1 through 7

    0.0504    0.0521    0.0538    0.0556    0.0575    0.0596    0.0617

  Columns 8 through 14

    0.0639    0.0662    0.0686    0.0711    0.0737    0.0764    0.0792

  Columns 15 through 21

    0.0821    0.0851    0.0883    0.0915    0.0949    0.0983    0.1019

  Columns 22 through 28

    0.1056    0.1094    0.1133    0.1174    0.1215    0.1258    0.1302

  Columns 29 through 35
```

*0.1347 0.1394 0.1442 0.1491 0.1541 0.1593 0.1646*

*Columns 36 through 42*

*0.1700 0.1756 0.1813 0.1871 0.1931 0.1992 0.2055*

*Columns 43 through 49*

*0.2119 0.2185 0.2252 0.2320 0.2390 0.2462 0.2535*

*Columns 50 through 56*

*0.2610 0.2686 0.2764 0.2843 0.2924 0.3006 0.3091*

*Columns 57 through 63*

*0.3177 0.3264 0.3353 0.3444 0.3537 0.3631 0.3727*

*Columns 64 through 70*

*0.3825 0.3925 0.4026 0.4129 0.4234 0.4341 0.4450*

*Columns 71 through 77*

*0.4561 0.4673 0.4787 0.4904 0.5022 0.5142 0.5264*

*Columns 78 through 84*

*0.5388 0.5514 0.5642 0.5772 0.5904 0.6038 0.6175*

*Columns 85 through 91*

*0.6313 0.6453 0.6596 0.6740 0.6887 0.7036 0.7187*

*Columns 92 through 98*

*0.7340 0.7496 0.7654 0.7813 0.7976 0.8140 0.8307*

*Columns 99 through 105*

*0.8476 0.8647 0.8821 0.8997 0.9175 0.9356 0.9539*

*Columns 106 through 112*

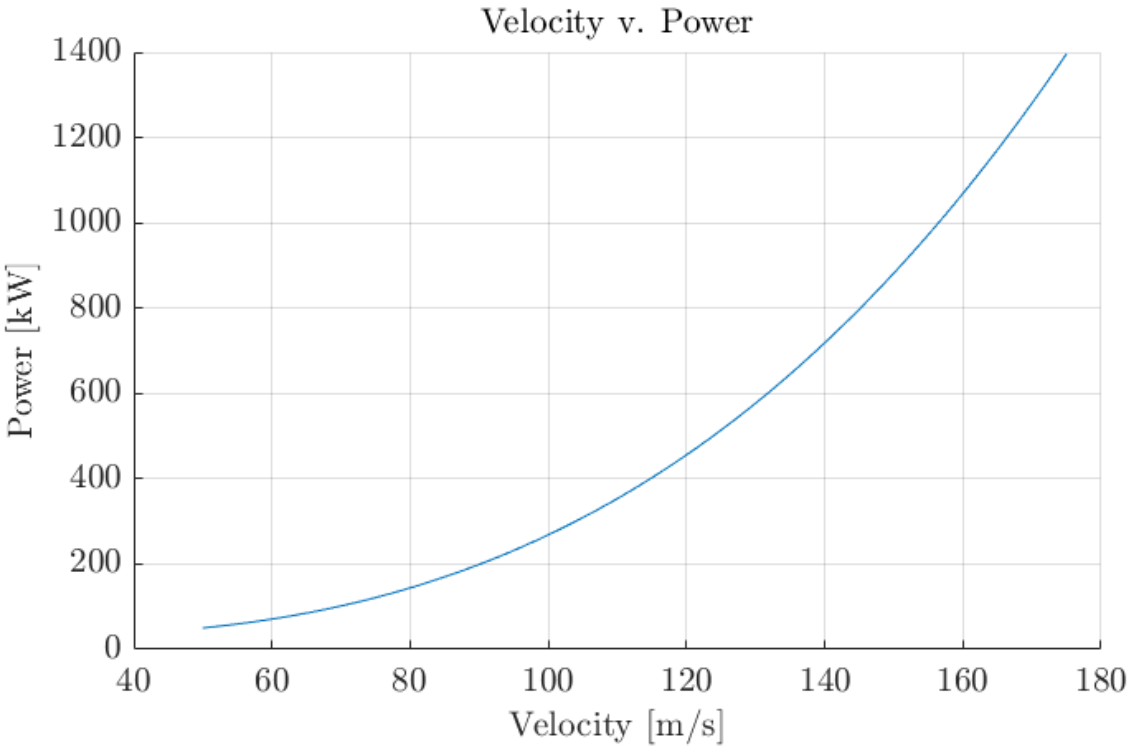
*0.9724 0.9912 1.0103 1.0296 1.0491 1.0689 1.0889*

*Columns 113 through 119*

*1.1092 1.1297 1.1505 1.1715 1.1928 1.2144 1.2362*

*Columns 120 through 126*

*1.2583 1.2806 1.3032 1.3261 1.3492 1.3726 1.3963*

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