
```

W = 55; % weight, lbf
S = 17.4; % wing reference area, ft^2;
A = 7.38; % wing aspect ratio
C_D0 = 0.0065; % flaps up parasite drag coefficient
e = 0.98; % airplane efficiency factor

h = 0; % altitude, ft
phi = 0; % bank angle, deg

h_m = convlength(h, 'ft', 'm');

[T, a, P, rho] = atmoscoesa(h_m, 'Warning');

rho = convdensity(rho, 'kg/m^3', 'slug/ft^3');

TAS_bg = sqrt((2*W) / (rho*S))...
    *(1./(4*C_D0.^2 + C_D0.*pi*e*A*cos(phi)^2)).^(1/4); % TAS,
    fps

KTAS_bg = convvel(TAS_bg, 'ft/s', 'kts');

KCAS_bg = correctairspeed(KTAS_bg, a, P, 'TAS', 'CAS');

gamma_bg_rad = asin( -sqrt((4.*C_D0')./(pi*e*A*cos(phi)^2 +
4.*C_D0')) );

gamma_bg = convang(gamma_bg_rad, 'rad', 'deg');

D_bg = -W*sin(gamma_bg_rad);

L_bg = W*cos(gamma_bg_rad);

qbar = dpressure([TAS_bg zeros(size(TAS_bg,2),2)], rho);

C_D_bg = D_bg./(qbar*S);
C_L_bg = L_bg./(qbar*S);

TAS = (70:200)'; % true airspeed, fps
KTAS = convvel(TAS, 'ft/s', 'kts'); % true airspeed, kts
KCAS = correctairspeed(KTAS, a, P, 'TAS', 'CAS'); % corrected airspeed,
    kts

qbar = dpressure([TAS zeros(size(TAS,1),2)], rho);

Dp = qbar*S.*C_D0;

Di = (2*W^2)/(rho*S*pi*e*A).*(TAS.^-2);

D = Dp + Di;

L = W;

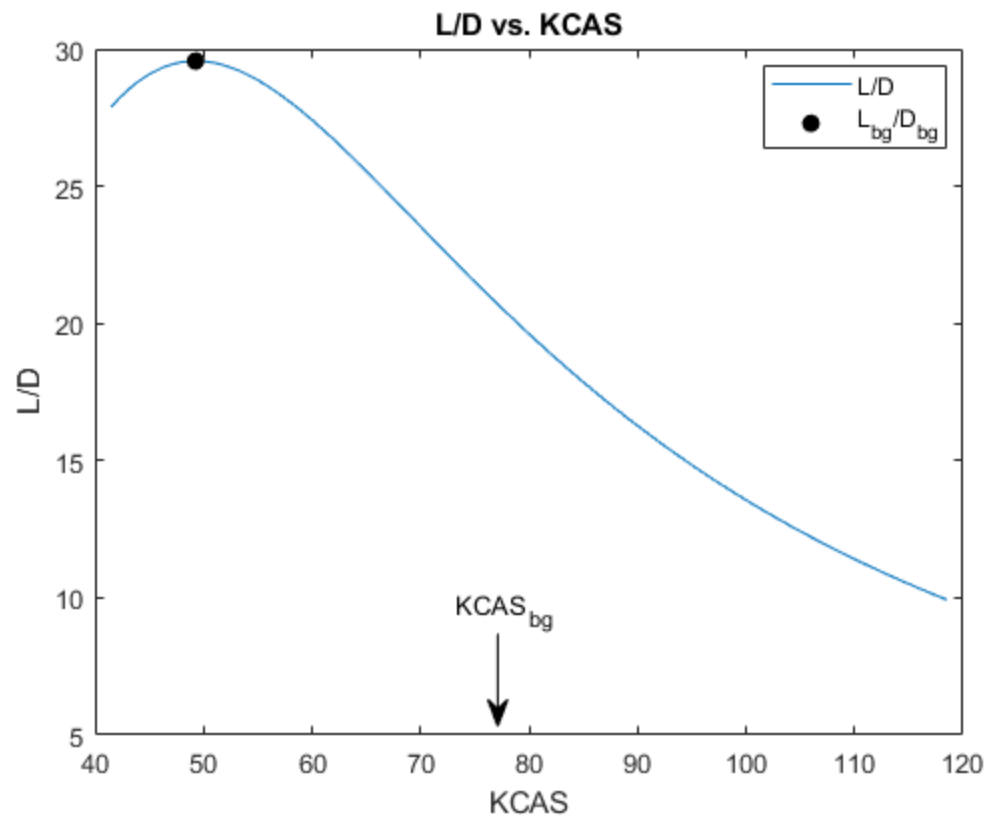
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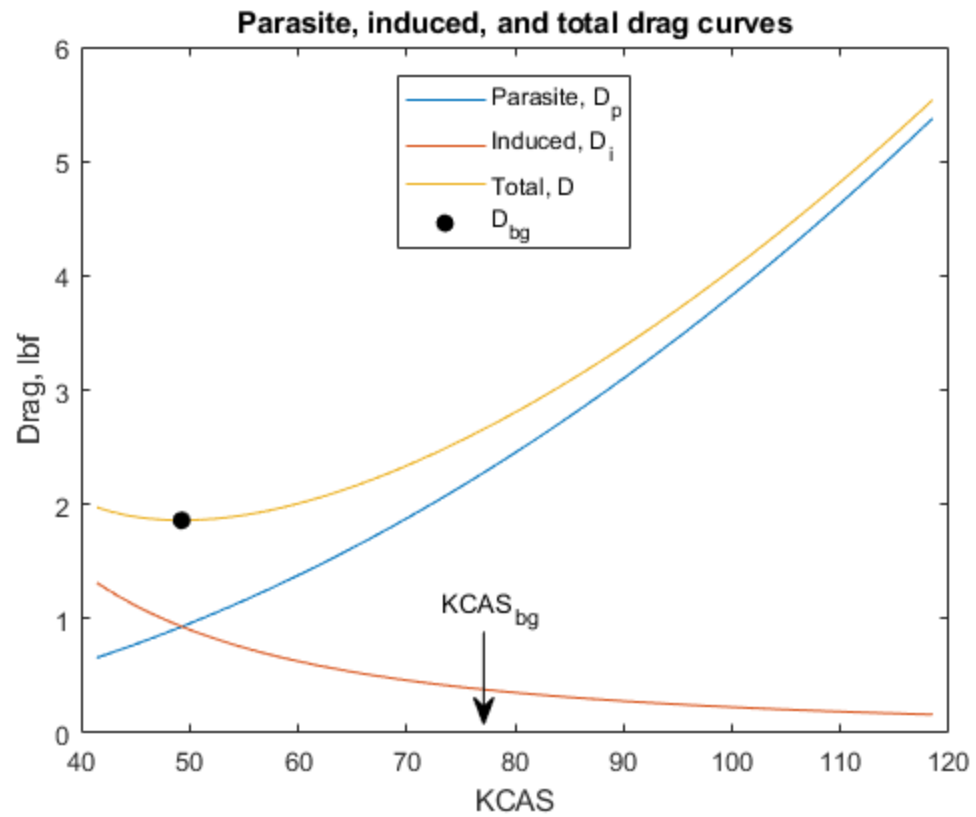
```

h1 = figure;
plot(KCAS,L./D);
title('L/D vs. KCAS');
xlabel('KCAS'); ylabel('L/D');
hold on
plot(KCAS_bg,L_bg/D_bg,'Marker','o','MarkerFaceColor','black',...
      'MarkerEdgeColor','black','Color','white');
hold off
legend('L/D','L_{bg}/D_{bg}','Location','Best');
annotation('textarrow',[0.49 0.49],[0.23 0.12],'String','KCAS_{bg}');

h2 = figure;
plot(KCAS,Dp,KCAS,Di,KCAS,D);
title('Parasite, induced, and total drag curves');
xlabel('KCAS'); ylabel('Drag, lbf');
hold on
plot(KCAS_bg,D_bg,'Marker','o','MarkerFaceColor','black',...
      'MarkerEdgeColor','black','Color','white');
hold off
legend('Parasite, D_p','Induced, D_i','Total, D',
      'D_{bg}','Location','Best');
annotation('textarrow',[0.49 0.49],[0.23 0.12],'String','KCAS_{bg}');

```





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