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%%hw3p3a
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L = 2;
D = 0.02;
h = 250;
rho = 8960;
E = 117 * 10^9;
K = 401;

P = pi*D;

Ih = @(t) pi./64 .* (D.^4 - (D-2.*t).^4);
Vh = @(t) pi.*L./4 .* (D.^2 - (D-2.*t).^2);
Ach = @(t) pi./4 .* (D.^2 - (D-2.*t).^2);
qfh = @(t, deltaT) sqrt(h.*P.*K.*Ach(t)) .* tanh(sqrt(h.*P./K./Ach(t)) .* L) .* (deltaT);
Fh = @(t, deltaT) 3.*E.*Ih(t)./L.^3./rho./Vh(t) .*qfh(t,deltaT);

Is = pi./64 .* D.^4;
Vs = pi.*L./4 .* D.^2;
Acs = pi./4 .* D.^2;
qfs = @(deltaT) sqrt(h.*P.*K.*Acs) .* tanh(sqrt(h.*P./K./Acs) .* L) .* (deltaT);
Fs = @(deltaT) 3.*E.*Is./L.^3./rho./Vs .*qfs(deltaT);

deltaT = 30;
t = 0:0.001:D/2;

fh = Fh(t,deltaT);
fs = Fs(deltaT);

ind = find(fh >= fs);
disp(strcat("Fh >= Fs when t = ", num2str(t(ind))));
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```
Fh >= Fs when t = 0.01
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