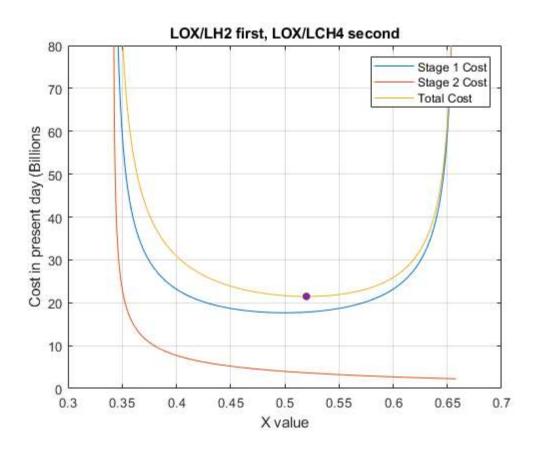
```
% I have the LOX/LCH4 second stage row
% the first stage I am selecting is LOX/LH2 and the
% second stage is LOX/LCH4
addpath('...')
% given Constants
Delta_1 = 0.08;
Delta_2 = 0.08;
Isp 1 = 327;
Isp_2 = 327;
m_PL = 26000;
% the range of x from 0 to 1 at 0.01 intervals and the
% number of x values we will have
X = 0:0.001:1;
X_{length} = 1001;
% the arrays
Stage1 cost = zeros(1,X length);
Stage2_cost = zeros(1,X_length);
% filling the arrays
S = 1;
while S <= X_length</pre>
    X_{position} = X(S);
    % call cost function
    [stageCost_nr1, stageCost_nr2] = cost_function(Isp_1, Isp_2, X_Position, Delta_1, Delta_2);
    % defind and populate the arrays from these values
    Stage1 cost(S) = stageCost nr1;
    Stage2_cost(S) = stageCost_nr2;
    S = S + 1;
end
%total it all together
Total_cost = Stage1_cost + Stage2_cost;
% finding the minimum cost
Minimum Cost = inf;
Minimum_X = NaN;
S = 2;
while S <= X_length</pre>
    if (Stage1_cost(S) > 0) && (Stage2_cost(S) > 0) && (Total_cost(S) < Minimum_Cost)</pre>
        Minimum_Cost = Total_cost(S);
        Minimum_X = X(S);
    end
    S = S + 1;
end
% Converting to billion dollars
Stage1 cost = Stage1 cost / 1000;
Stage2_cost = Stage2_cost / 1000;
Total_cost = Total_cost / 1000;
Minimum_Cost = Minimum_Cost / 1000;
% making the plots
```

```
plot(X, Stage1_cost);
hold on;
plot(X, Stage2_cost);
plot(X, Total_cost);
plot(Minimum_X, Minimum_Cost, '.', 'MarkerSize',20)
ylim([0,80]);
xlabel('X value');
ylabel('Cost in present day (Billions');
title('LOX/LH2 first, LOX/LCH4 second');
legend('Stage 1 Cost', 'Stage 2 Cost', 'Total Cost');
grid on;
```



Published with MATLAB® R2024b