Optimum Design Spring 2016
Homework # 3

Homework 3 Part II - Gradient-Based Search for Finding Optimum

Objectives

Implement three types of gradient-based search methods:

1. Equal-interval search method
2. Alternate equal-interval search method
3. Golden section search method

Each of these three functions searches for the maximum value of a given unimodal function f(x). The upper and lower boundaries of the x value, the interval for the initial bracketing (δ) and the tolerance of the approximation error (ε) can be specified as input arguments.

Programming Requirements

Equal-interval search function

Write a MATLAB function m-files named “ei_max.m.”

```
[ymax, xmax]  = ei_max(func_name, ub, lb, tolerance, delta, r)
% func_name is the name of the function m-file that you are going to evaluate.
% In this homework assignment, it will be cutter_ma.m or cutter_avg_ma.m
% ub and lb define the range of the handle (start) angle
% tolerance indicate the amount of error that is acceptable
% delta is the interval for the initial bracketing
% r is a small value (<< 1) for the phase II search
```

Alternate equal-interval search function

Write a MATLAB function m-files named “aei_max.m.”

```
[ymax, xmax] = aei_max(func_name, ub, lb, tolerance, delta)
```

Golden section search function

Write a MATLAB function m-files named “gs_max.m.”

[xmax, ymax] = gs_max(func_name, ub, lb, tolerance, delta)

These three search functions are made callable to your “cutter_analysis.m,” so that it can plot the maximum MA point on your figure. An sample screen is provided in Figure 1.

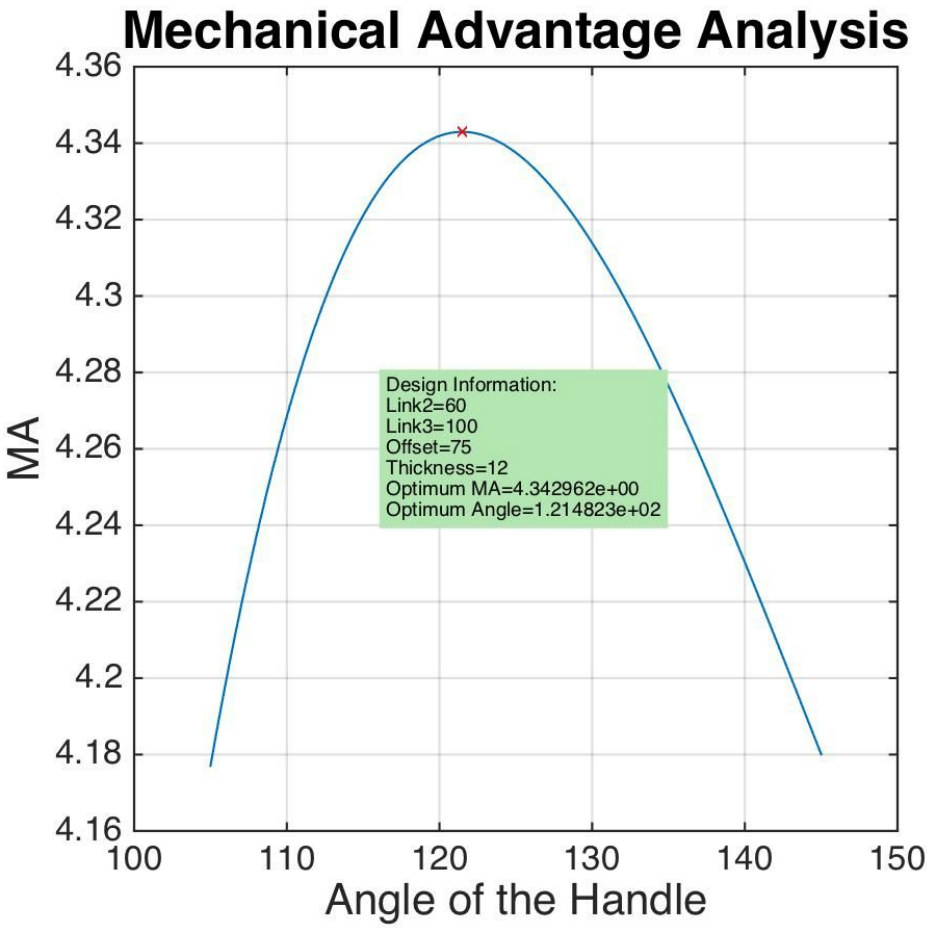

Figure 1: The maximum MA point is found by the search function and shown as ‘x’ in red.