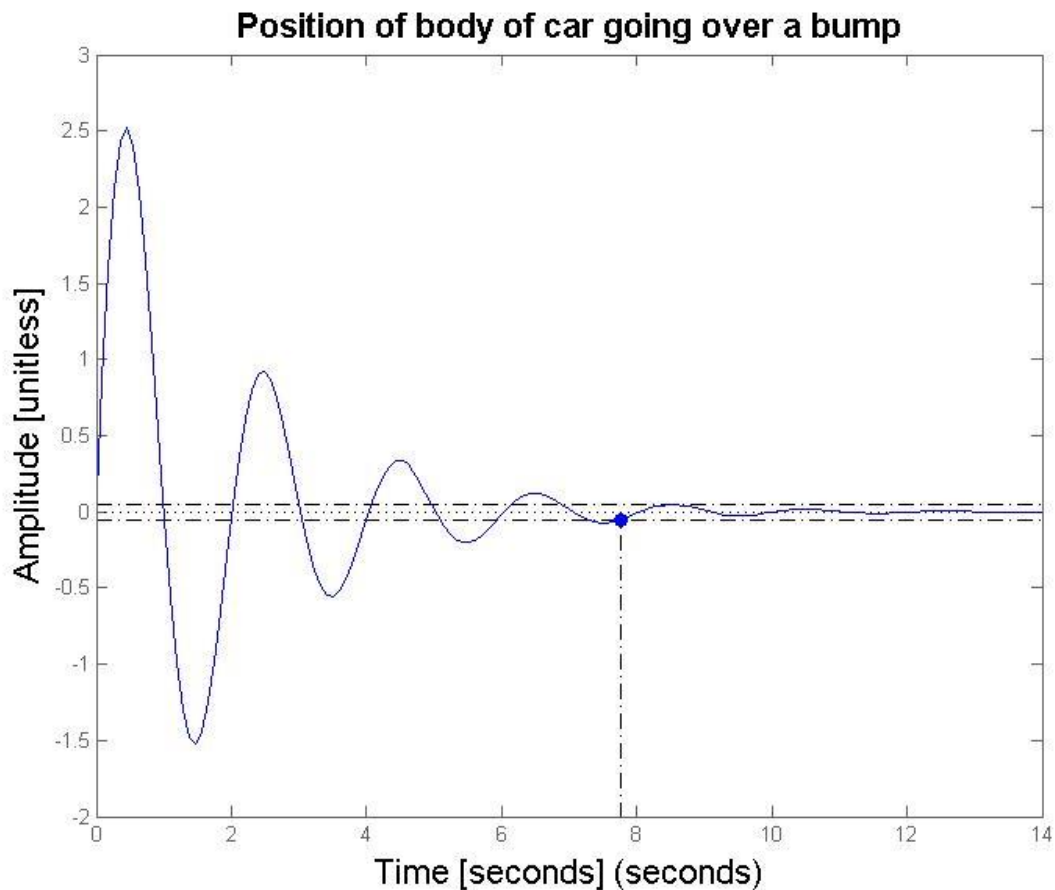


Title

Is my suspension broken?

Problem Description

The figure below shows the position of a car as it goes over a bump¹.



From the graph, you can see that as soon as the car hits the bump (at $t = 0$) it starts to oscillate up and down for some number of seconds until it eventually settles down and returns to its original position. Once it settles, the car keeps oscillating but it never goes outside of the two dashed lines². For the purposes of our discussion, we will assume that the car has settled down when the position always stays within the range $[-0.02, 0.02]$ and **never moves outside of that range again**. Not surprisingly, engineers refer to the time it takes for a system like this to enter that range as the “settling time” of the system. In this problem, you will analyse the data above, which is provided to you in a text file called `carSuspension.txt`. Your job is to determine the settling time of the car.

¹ More or less. In reality the graph would look a bit different, but for the purposes of our discussion today this is good enough.

² This is one of the reasons that the graph would look different in reality!

The data is organized in the file as ordered pairs of time and position. The first three lines are shown below:

```
0 0
```

```
0.092103 0.86751
```

```
0.18421 1.5889
```

You do not know how many entries are in the file, and you may not use arrays to solve this question.

Testing

Note: the graph shown above does NOT contain the same data as the test file. For your test file, the answer should be between 9 and 10 seconds. Exactly where in that range is up to you to find out.

Time Target

- *** less than 20 minutes
- ** 20-30 minutes
- * greater than 30 minutes

Sections

Loops, file IO, problem solving