MA5710 Assignment-1 Question 2

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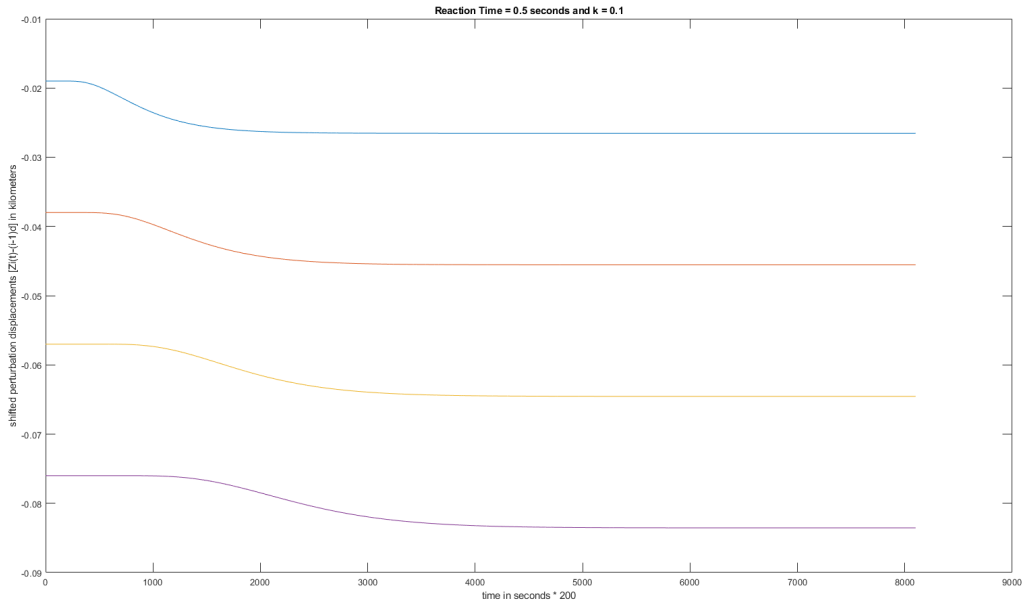
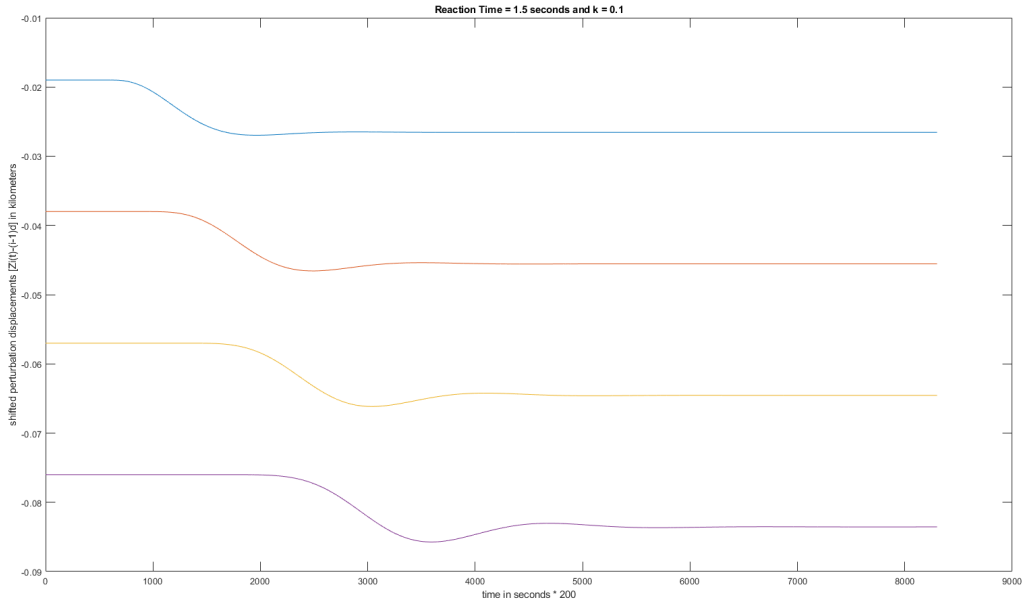
For the given data, the plots found using Euler's method are given as:

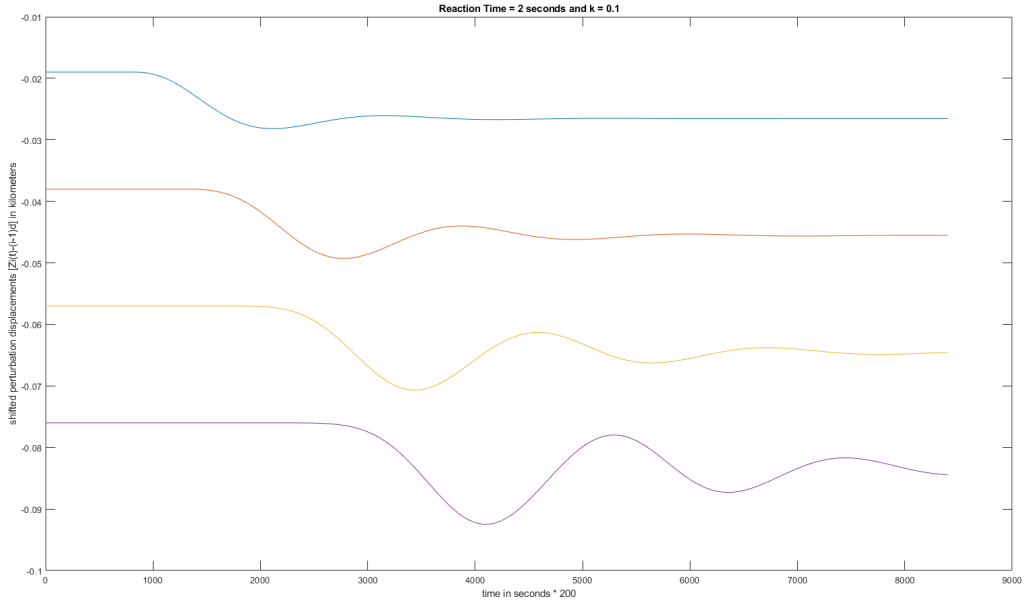
1) k = 0.1



Plot for k = 0.1 and driver's reaction time = 0.5 seconds

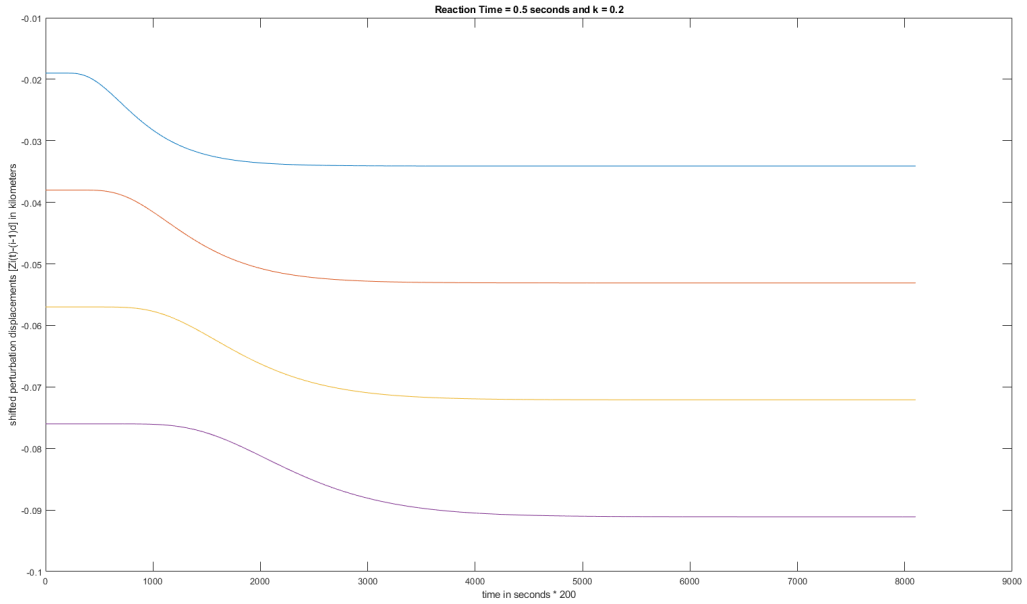


Plot for k = 0.1 and driver's reaction time = 1.5 seconds

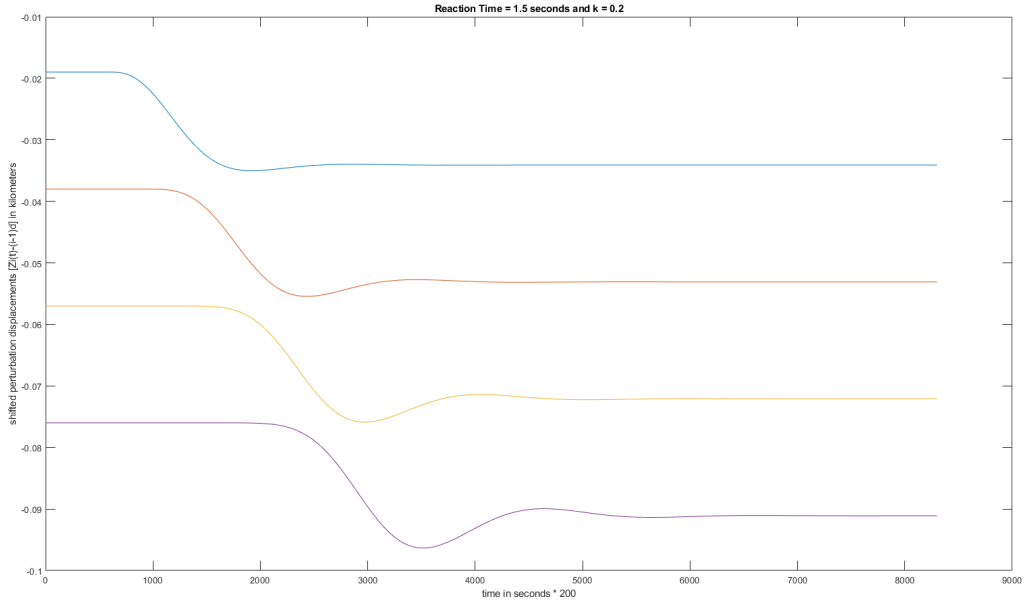


Plot for k = 0.1 and driver's reaction time = 2 seconds

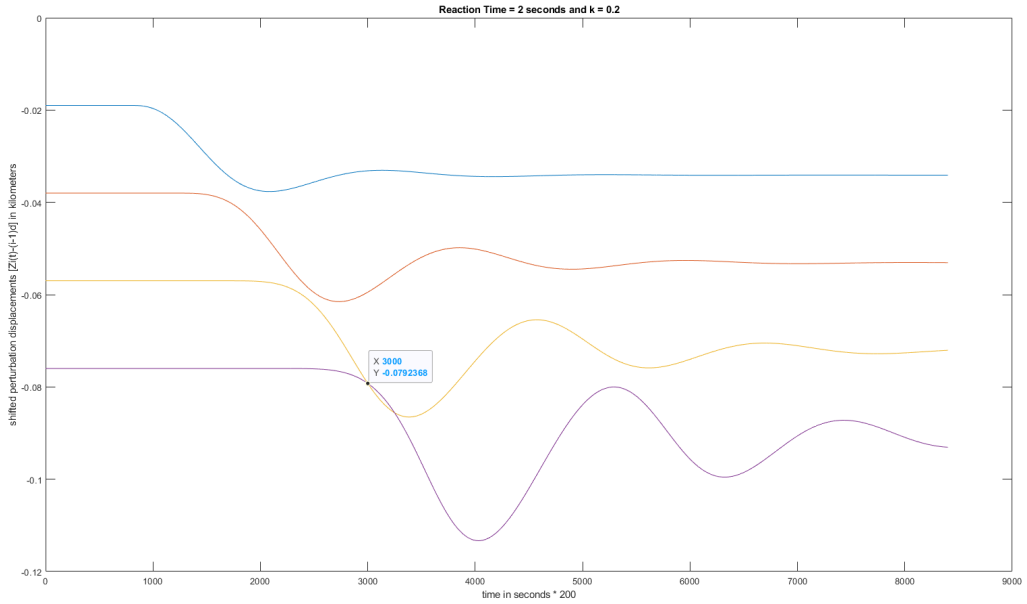
2) k = 0.2



Plot for k = 0.2 and driver's reaction time = 0.5 seconds



Plot for k = 0.2 and driver's reaction time = 1.5 seconds



Plot for k = 0.2 and driver's reaction time = 2 seconds

As it can be seen, when k = 0.2 and driver's reaction time = 2 seconds, the 4th and 5th cars collide when the x-coordinate is 3000.
As the coordinates have been scaled by a factor of 200, the time of collision can be given by:

$T_{collsion}$ = (3000/200) seconds = 15 seconds

We don't look at the second point of intersection because once the two cars have collided, the model fails for the 5th car.

PS: It is suggested to read this document at 167% of its original size for good readability of the graphs.

References:

1) Prof. Sundar's Class Notes
2) Mathematical Modelling: A Case Studies Approach Volume 27