

CEE 744

Periodic response analysis:

Develop a solution for the response felt by a driver crossing a bridge similar to the south beltline highway viaduct. For fun, we'll look at how different cars and drivers respond to the trip.

The first part of the problem setup is in a MathCad file you can download from the class web site. Finish the MathCad sheet for the response solution.

Provide the following summary of information on your solution:

1. natural period and damped period of your car
2. the time to cross one span (period of loading)
3. time to cross the bridge (duration of loading)
4. at least the first four " a_n " values from your representation of the load
5. the peak *relative* displacement of the driver
6. the peak total displacement of the driver
7. the number of " a " values you decided to use in your solution

Submit: 1) your MathCad solution electronically to the class web site

2) the summary data above on a paper sheet

3) a plot of the series representation of the load on a sheet

4) a plot of relative displacement vs time on a sheet

5) a plot of the sum of steady state solutions for relative displacement on a sheet

6) a plot of your transient solution on a sheet

8) a plot of the total car displacement with the bridge shape on a sheet

Driver	speed	car weight	shocks (% damp)	springs (lb/ft)
Nasser	30	1500	75	2400
Sam	50	1500	75	2400
Jeffryd	80	1500	75	2400
Tom	50	2300	75	2400
Moon	50	1500	75	3600
Ian	50	2200	50	3600
Henrik	80	1500	50	2000
Derek	80	2200	50	3600
Brad	50	1200	40	2000