

2.3 Input parameters

Table 2: Values for suspension system

Symbol	Quantity	Unit	Values
m_w	Mass of wheel	Kg	10
m_v	Mass of vehicle body	Kg	100
K_s	Stiffness of vehicle body	N/m	18600
K_t	Stiffness of tire	N/m	266252
C_s	Damping coefficient of vehicle body	N-s/m ²	1490

3. Road Profiles

Actual disturbances in road profile are bumps and potholes of different sizes. Bump or pothole is assumed to be of 10 cm.

3.1 Sinusoidal profile

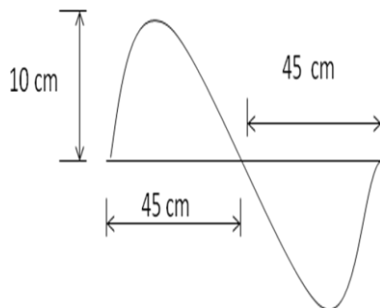


Figure 4: Sinusoidal profile

3.2 Step Profile

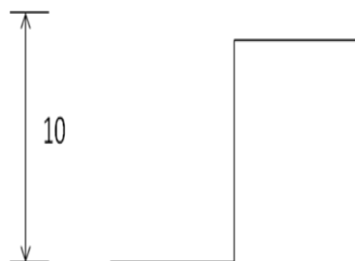


Figure 5: Step profile

3.3 Square Profile

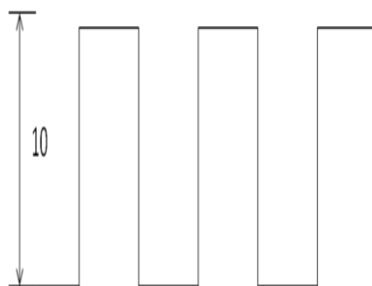


Figure 6: Square profile

3.4 Sinc Profile

Amplitude goes on decreasing in this type.

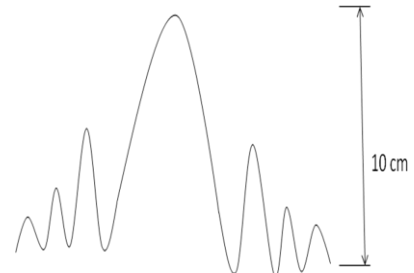


Figure 7: sinc profile

3.5 Triangular Profile

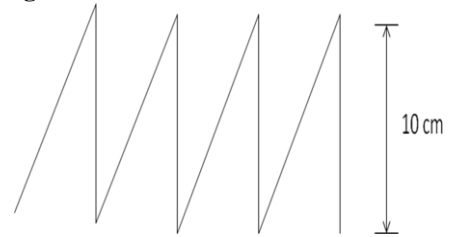


Figure 8: Triangular profile

4. Results

4.1 Sinusoidal Profile

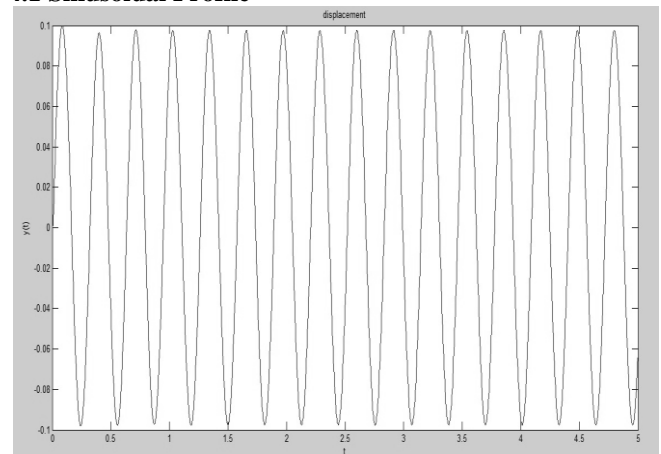


Figure 9: Displacement of wheel vs time

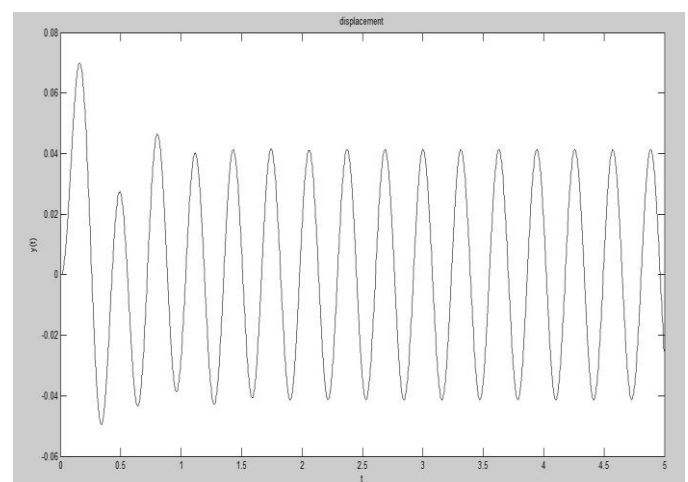


Figure 10: Displacement of Vehicle body vs time

4.2 Step Profile

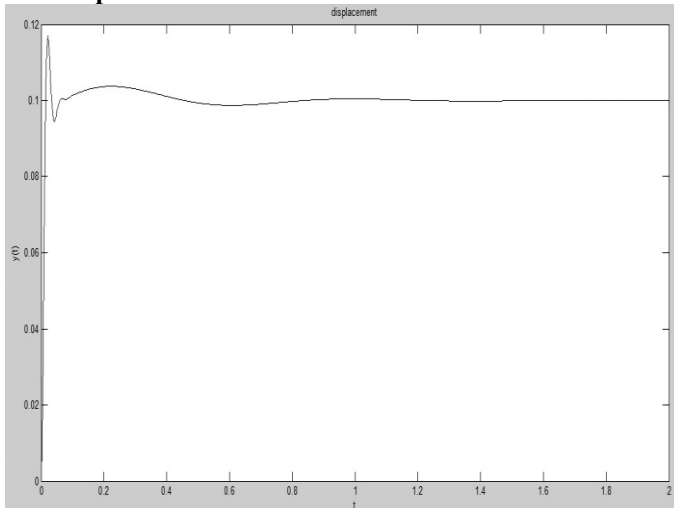


Figure 11: Displacement of wheel vs time

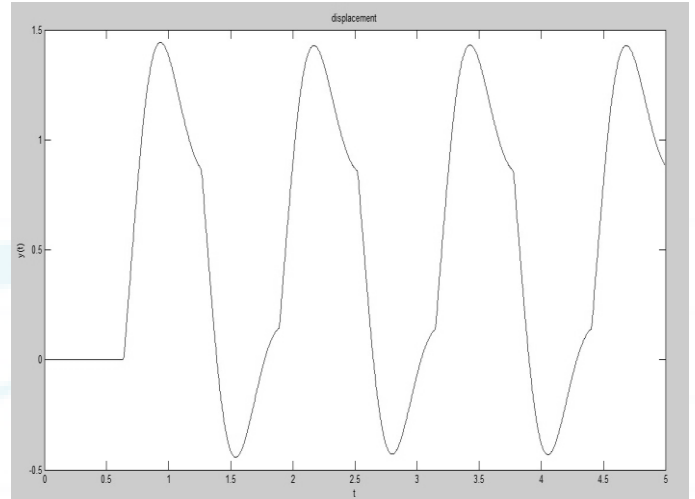


Figure 14: Displacement of Vehicle body vs time

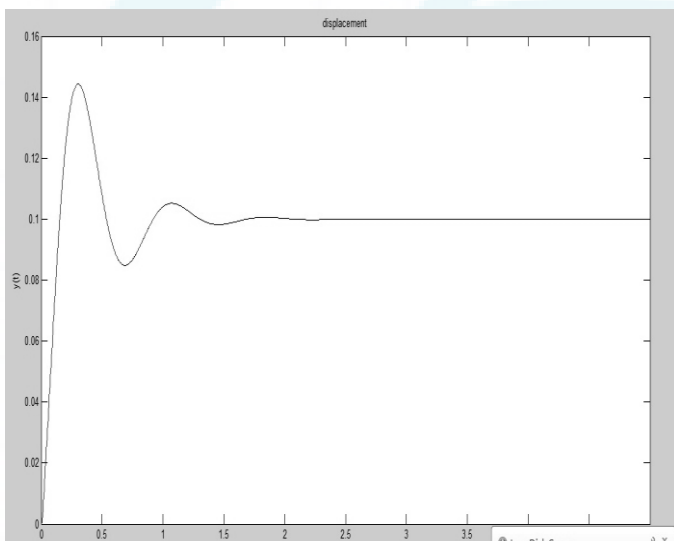


Figure 12: Displacement of Vehicle body vs time

4.4 Sinc profile

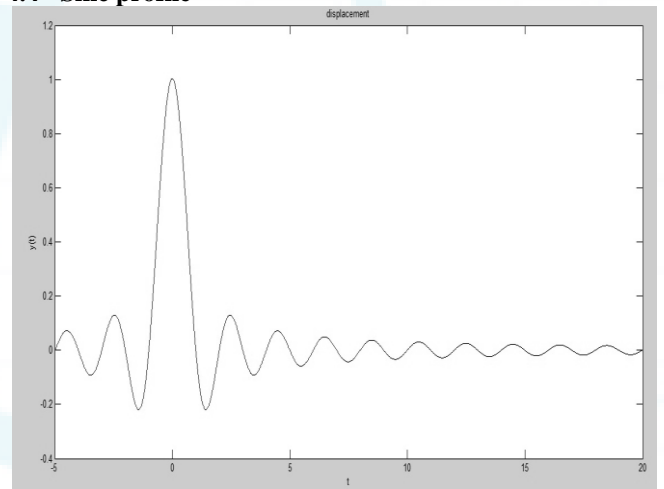


Figure 15: Displacement of wheel vs time

4.3 Square Profile

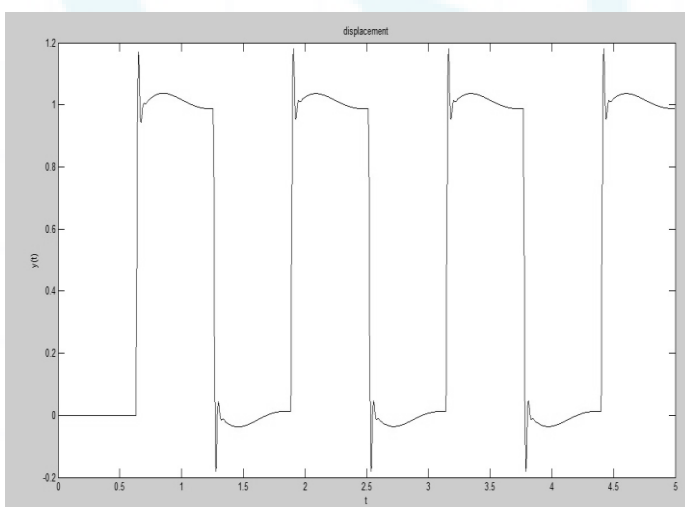


Figure 13: Displacement of wheel vs time

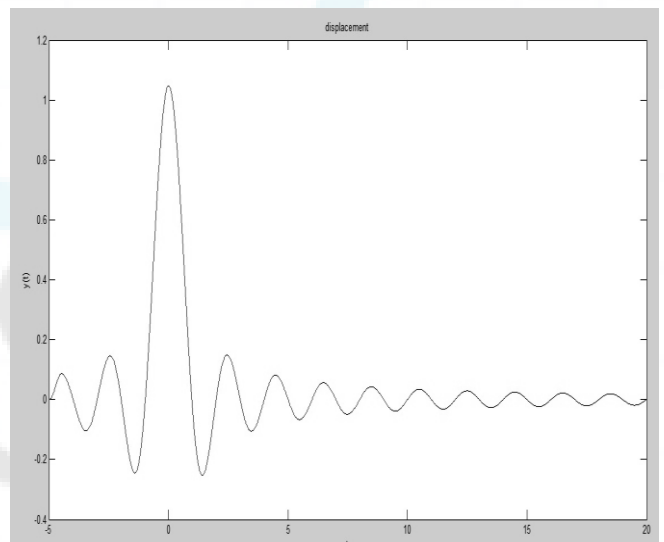


Figure 16: Displacement of Vehicle body vs time

4.5 Triangular Profile

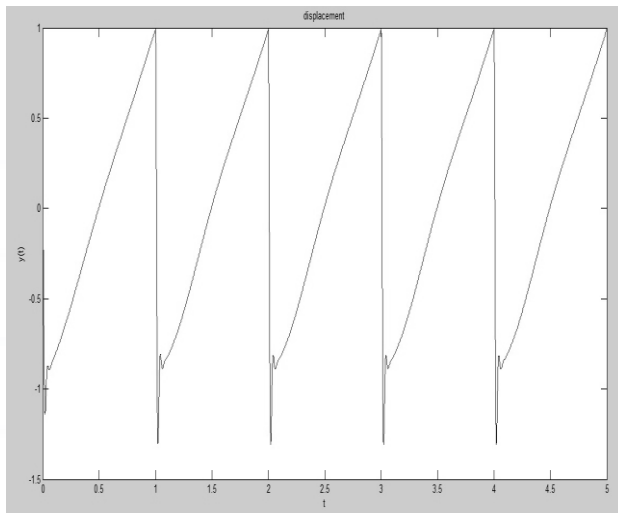


Figure 17: Displacement of wheel vs time

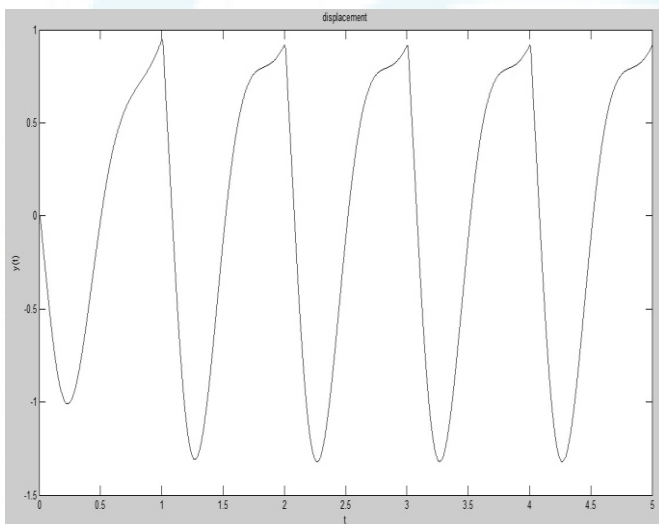


Figure 18: Displacement of Vehicle body vs time

5. Conclusion

Responses for different road profiles are plotted. From the responses we can conclude that:

- 1) Practical road disturbances are bumps and potholes, so the profile which is nearer to the actual road profile is sinusoidal profile.
- 2) Sinc road profile which is an extension of sinusoidal road profile. In this profile the peak amplitude is unity and with the time, amplitude goes on decreasing. So we get Bumps and Potholes of various sizes as that of the actual condition.
- 3) Square and triangular road profiles are not as per the actual conditions but it can be considered for studying sudden impacts occurring and how the vehicle suspension will react to it.
- 4) From above observation, we can conclude that sinusoidal and sinc can be used to get accurate results. Step, Square, triangular road profiles can be used for the study purpose.

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