**Homework Set 3e**

**Geotechnical Earthquake Engineering**

**Earthquake Generation**

Generate artificial earthquake for site in Memphis, Tennessee using the following:

|  |  |  |
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| **Parameter** | **Western U.S.** | **Central & Eastern U.S.** |
| Source Spectrum | -square, point source | -square, point source |
| Stress Drop,  (bars) | 100 | 150 |
| Geomtric Attenuation | *R*-1; *R* < 40 km  *R*-0.5; *R* >= 40 km | *R*-1; *R* < 70 km  *R*0; 70<*R* <130 km  *R*-0.5; *R* > 130 km |
| Source Duration,  *Ts* (sec) | 1/*f0* | 1/2*f0* |
| Path Duration, *Tp* (sec) | *0.05 R for all values* | 0 *R* < 10 km  9.6; 10< *R* < 70 km  *7.8*; 70< *R* < 130 km  *0.04*; *R* < 130 km |
| Path Attenuation, *Q* | 214*f0.45* |  |
| Focal Depth | 10 km | 10 km |
| Site attenuation, *k* | 0.0400 | 0.0084 |
| Shear wave velocity, s  (km/s) | 3.5 | 3.6 |
| Density, s (gm/cc) | 2.8 | 2.8 |
| Window shape | Exponential | Exponential |
| High Cut Freqeuency, *fm* | 100 | 100 |
| Magnitude | 7 | 7 |
| Distance | 40 km | 40 km |
| Amplification Factors | Use Table 4 of Campbell (2003) [Paper 4 on web site] | Use Table 4 of Campbell (2003) |

1. Using data from SMSIM, plot
   1. Displacement Time History
   2. Velocity Time History
   3. Acceleration Time History
   4. Response Spectrum
2. Use your Mathcad file and acceleration time history obtained from SMSIM,
   1. Determine the Displacement Time History
   2. Velocity Time History
   3. Response Spectrum for 5% damping
3. Plot the response spectra from part “a” and “b” on the same graph. (Hint: you should get a graph simialr to the “B6” file given on the site).

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|  | **From your mathcad** | |
| **Western U.S.** | **Central & Eastern U.S.** |
| Peak Acceleration |  |  |
| Peak Velocity |  |  |
| Running Sum |  |  |
| Simpson’s Rule |  |  |
| Peak Displacement |  |  |
| 3-Cycle (max Accl) |  |  |
| Predominant Period |  |  |
| Vmax / amax |  |  |
| 2Vmax / amax |  |  |
| Td |  |  |
| a­rms |  |  |