Mechanical/Structural Engineering

Practice exercise solution:

If a new bridge design has a single peak vibration amplitude X = 3mm or 0.003m at a frequency ω =5 cycles/sec find the single peak velocity v and the peak acceleration a.

Convert ω from cycles/sec to radians/sec, ω =5 x 2π =10 π radians/sec

Peak velocity occurs $v = \omega X$ = 10 π 0.003 = 0.94 m/sec

Peak acceleration $a = -\omega^2 X = (10\ \pi)^2\ 0.003 = 2.96$ m/sec^2