Low-Frequency Random

SDOF response

Miles: $G_{rms} = \sqrt{\frac{\pi}{2} f_n Q \, ASD(f_n)}$

Exact: $G_{rms}^2 = \int |T(f)|^2 ASD(f)\, df$, $|T|^2 = \frac{1+(2\zeta\rho)^2}{(1-\rho^2)^2+(2\zeta\rho)^2}$, $\rho = f/f_n$

Segment area ($ASD = A_1(f/f_1)^N$): $\frac{A_1 f_1}{N+1}\left[(f_2/f_1)^{N+1} - 1\right]$

Combination (NASA Lessons Learned 0652)

Random peak $= 3\sigma$; $n = n_{QS} \pm \sqrt{n_{tr}^2 + (3\,G_{rms})^2}$