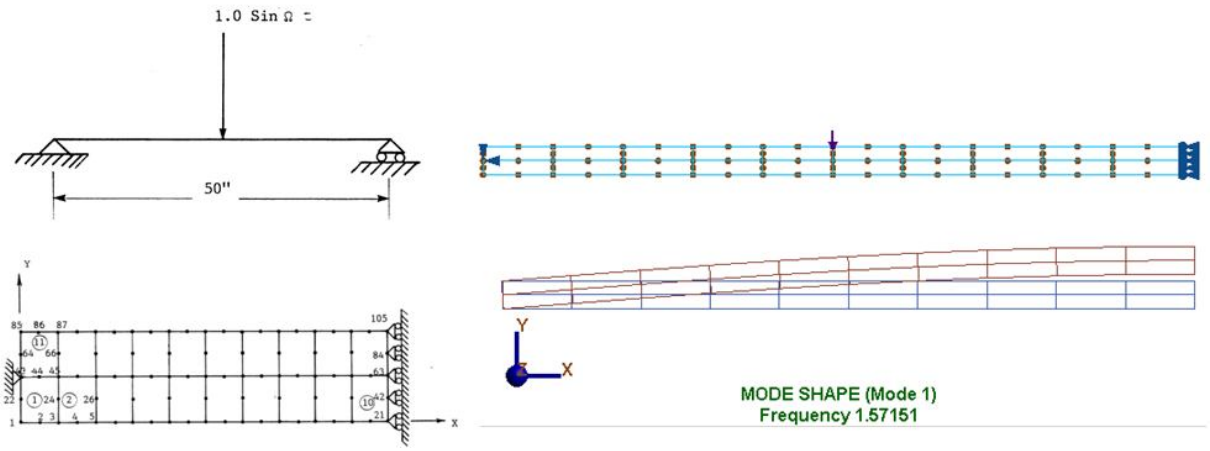
Frequency response analysis of a simply supported beam



Boundary condition	:	Simply supported at left end and symmetric BC at mid span (only half is modeling)
Loading	:	Concentrated load of 1 sin $\pi/2$ at mid span. The amplitudes of displacements and stresses are to be computed for an exciting frequency of 10 *Hz* with zero damping. An eigenvalue analysis using consistent mass formulation and conventional subspaceiteration technique is carried out first, from which the first 3 symmetric modes are obtained.The frequency response run is performed for all the three modes.
Material property	:	($E_X = 7.5\times10^7 psi$, $\nu = 0.0$,$\rho = 1.0 lb\text{-}sec2/in^4$)
Beam property		l = 50 *in.*, b = 1 *in.*, h = 1 *in.*
Element type	:	2-D plane stress element.. Taking advantage of symmetry, only half the beam is modeled with 8-noded plane stress elements.
Finite element statistics	:	Number of nodes 85; Number of elements 20; Degrees of freedom 61

Output parameters	**Theoretical value**	**FEAST^{SMT}**	**NISA2$^{®}$**
Natural frequencies, *Hz*			
Mode1	1.57	1.57	1.57
Mode2	14.14	14.19	14.07
Mode3	39.27	39.74	38.76