

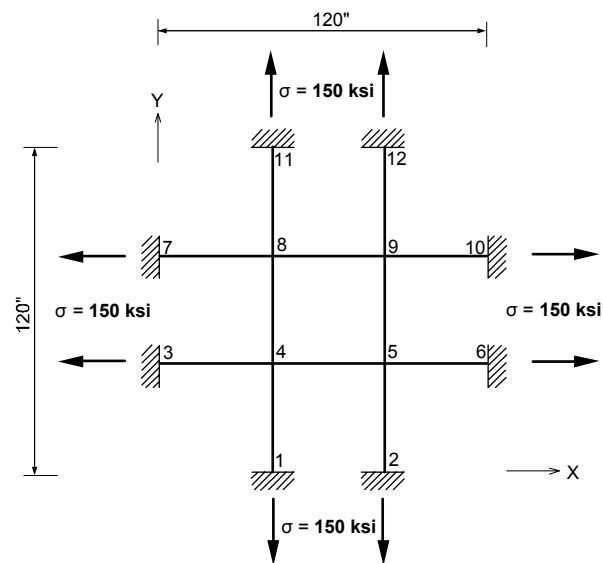
# Eigen-16

## Title

Free vibration analysis of a cable net structure

## Description

A cable net structure is subjected to the initial stress,  $\sigma = 150 \text{ ksi}$ .  
Determine the frequency of a free vibration.



*Structural geometry and analysis model*

## MODEL

### *Analysis Type*

3-D eigenvalue analysis

### *Unit System*

in, lbf

### *Dimension*

Length 120 in   Width 120 in

### *Element*

Truss element

### *Material*

Modulus of elasticity    $E = 2.0 \times 10^4$  ksi

Poisson's ratio    $\nu = 0.0$

Weight density    $\gamma = 0.29$  lbf/in<sup>3</sup>

### *Sectional Property*

Area: 0.5 in<sup>2</sup>

### *Boundary Condition*

Node 1~3, 6, 7, 10~12: Constrain all DOFs

### *Load Case*

Initial stress 150 ksi

## Results

EIGENVALUE ANALYSIS								
	Mode No	Frequency		Period (sec)	Tolerance			
		(rad/sec)	(cycle/sec)					
	1	353,25	56,22	0,02	1,4410e-009			

*The first frequency (Number of nodes for each cable: 3)*

EIGENVALUE ANALYSIS								
	Mode No	Frequency		Period (sec)	Tolerance			
		(rad/sec)	(cycle/sec)					
	1	365,71	58,20	0,02	6,0495e-007			

*The first frequency (Number of nodes for each cable: 6)*

EIGENVALUE ANALYSIS								
	Mode No	Frequency		Period (sec)	Tolerance			
		(rad/sec)	(cycle/sec)					
	1	368,87	58,71	0,02	3,5649e-007			

*The first frequency (Number of nodes for each cable: 12)*

## Comparison of Results

Result	Galerkin membrane analogy (Ref.1)	Membrane analogy (Ref.2)	FEM analysis (Ref.3)			MIDAS/Civil		
			3 nodes	6 nodes	12 nodes	3 nodes	6 nodes	12 nodes
			Unit: Hz					
Frequency	59.10	58.80	61.59	59.55	59.05	56.22	58.20	58.71

## References

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