HLAENGINEERS, INC.

FINITE ELEMENT STRUCTURAL AND BUCKLING ANALYSIS OF AN ANTENNA

PURPOSE: Evaluate the structural deflection, stress and eigenvalue buckling modes of an antenna due to wind loads

An FEA stimulation was conducted on an antenna with 125 MPH wind loads at various wind and elevation angles in 15 degree intervals. The wind pressure distributions for various orientations were computed by interpolation of data from wind tunnel test literature. The pressure distributions were applied to the dish using element surface pressures. Additional loads on the boom substructure and any parts exposed or in the direct wind path were computed on an element by element basis and applied as directional nodal loads. For each orientation, a separate FEA model was created with the correct relative positions of the individual parts. Gravity and wind loads were applied to the model and an FEA solution was sort for each model. Using a buckling analysis on each model, the structure was checked for the possibility of structural buckling under the specified wind loads. Structural connections were checked for allowable stresses and margin of safety. Fatigue life computations were made from these results by random load sequencing.

WIND PRESSURE

ELEV = 30 WIND = 180 MPH = 125

EL = 0°   WA = 60°