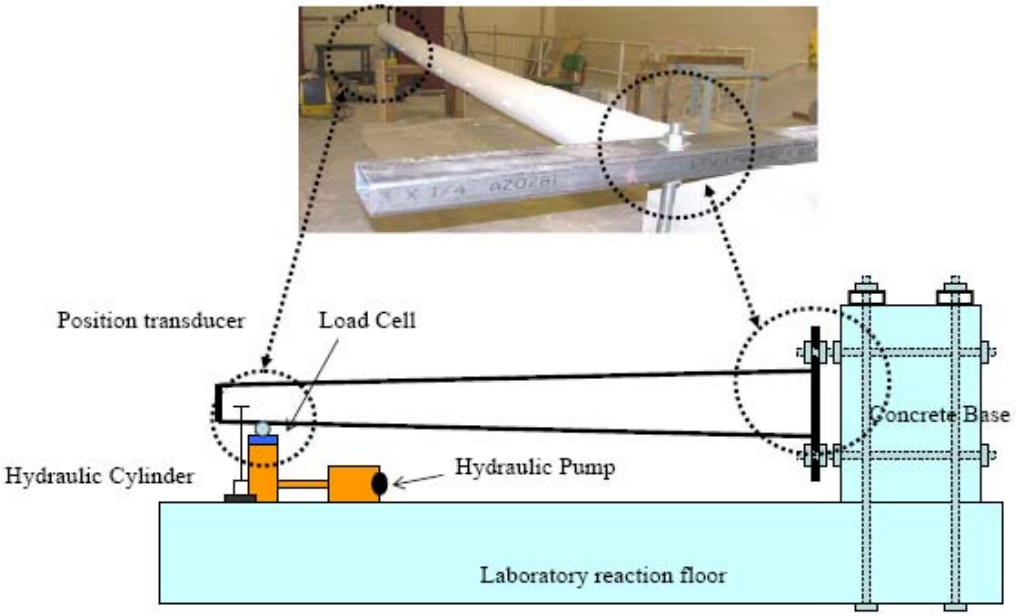
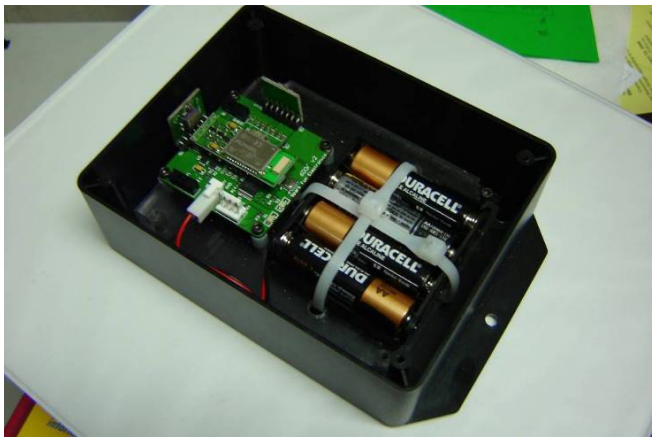
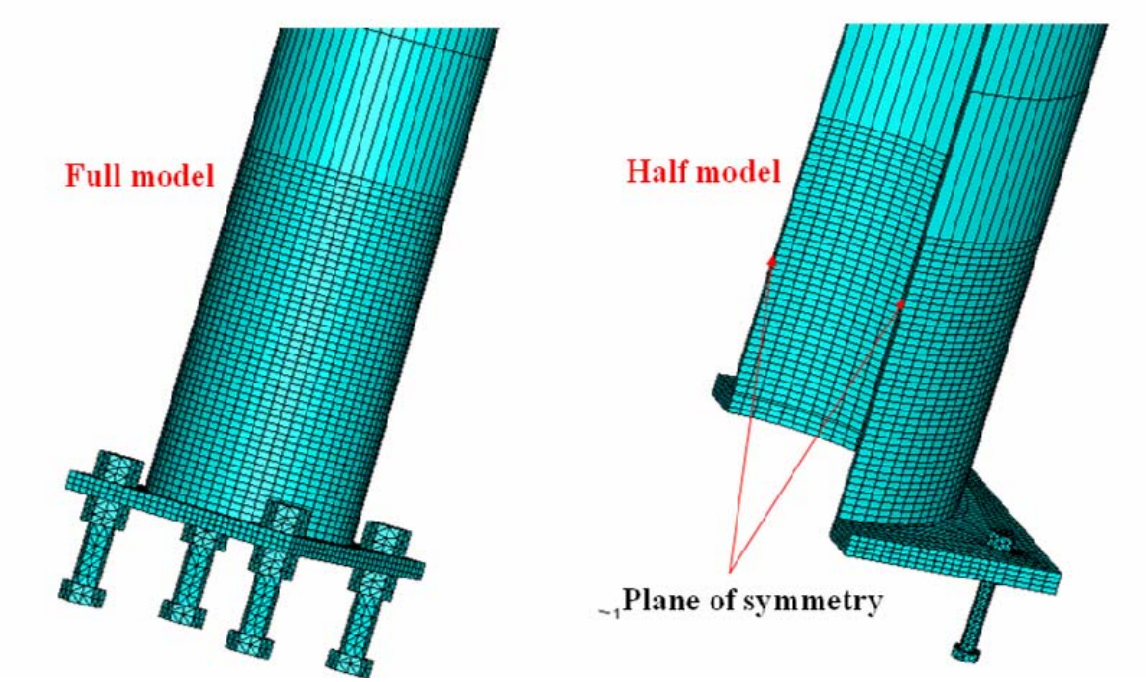
Vibration Control of CCTV Camera Poles

Long tapered steel poles are generally used by department of transportation for CCTV cameras the image of which is transmitted for traffic monitoring. The images are distorted to due wind induced vibration depending on pole's frequency. In this project a three-dimensions finite element analyses of tapered poles were conducted to obtain the natural frequency with the changing of pole geometry variables. The poles were created by considering the nonlinear coupling behavior between material, contact, and geometric effects. The elastoplastic solid elements with eight nodes are employed for the effective 3D finite element modeling and analysis. A node-to-surface contact algorithm is used to simulate the interaction between contact surfaces. An energy-based convergence criterion is adopted to obtain the converged coupled nonlinear solutions. Also, a parametric study is conducted to verify the validity of FEMs and analysis algorithm by observing the effects of the geometric variables, one at the time, on the natural frequency characteristics of the poles.

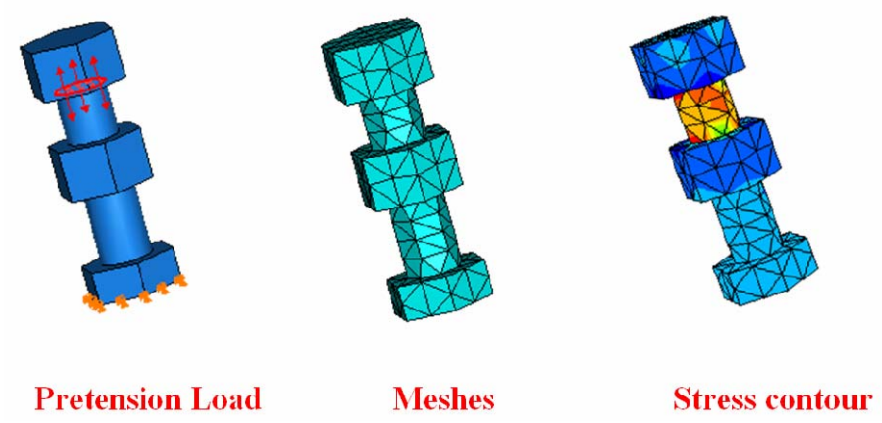

Position transducer
Load Cell
Concrete Base
Hydraulic Cylinder
Hydraulic Pump
Laboratory reaction floor



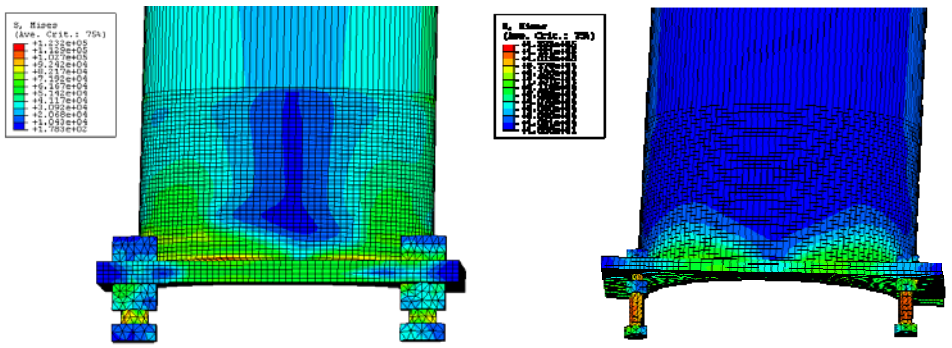
Experimental pictures



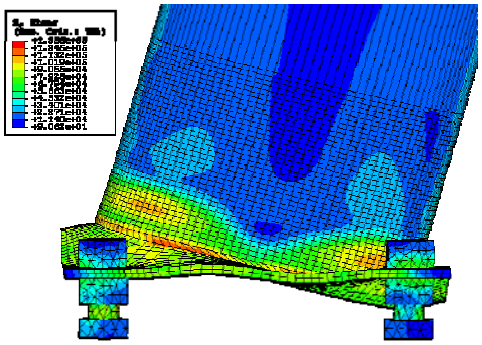
Pole Model



Bolt model

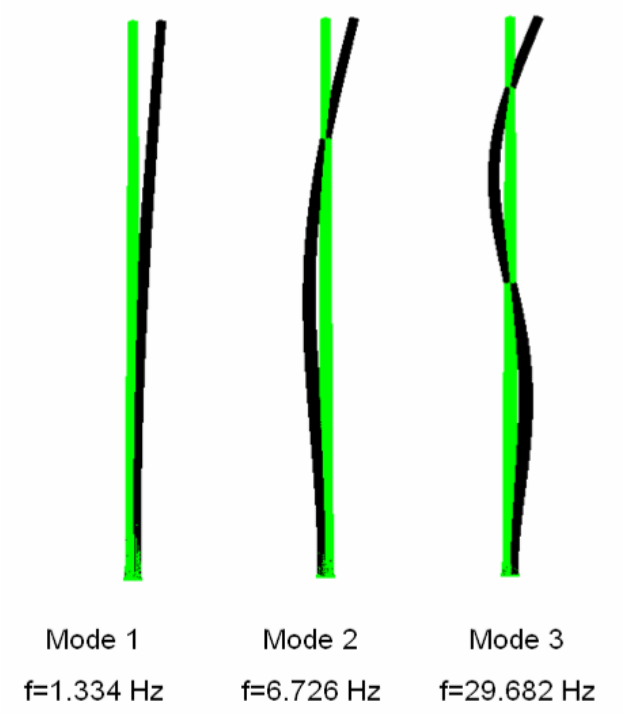


(a) **(b)**



(c)

Figure Stress contour and typical deformation at end-plate under horizontal load (a) Strong bolts and endplate; (b) Small diameter bolt; (d) Thin end-plate



Typical Mode Shapes of Pole