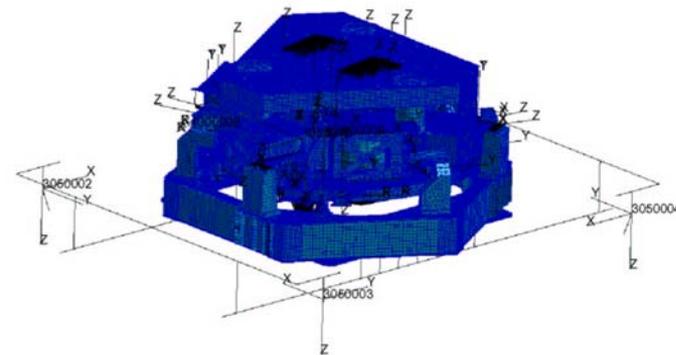
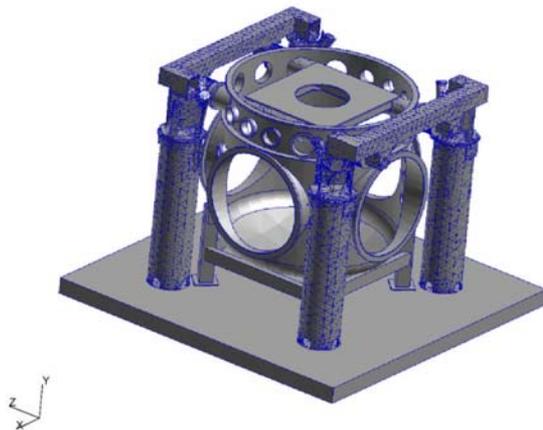


LASTI STRUCTURE MODELING

Ken Mason, Richard Mittleman



5/24/2005

LASTI STRUCTURE MODELING

- **Compare model to structure characterization being done at LASTI by Rich Mittleman**
 - » Modal analysis of BSC structure at LASTI without BSC chamber
 - » Grounded springs simulate bellows stiffness between chamber and
 - » Add in BSC chamber, bellows, and cement floor to see if they play a role in pier amplification

- **Verify the strength of the crossbeams with the higher weight of the advanced LIGO isolation system**

- **Test modifications to the structure to improve resonances and improve the movement at the top of the piers**

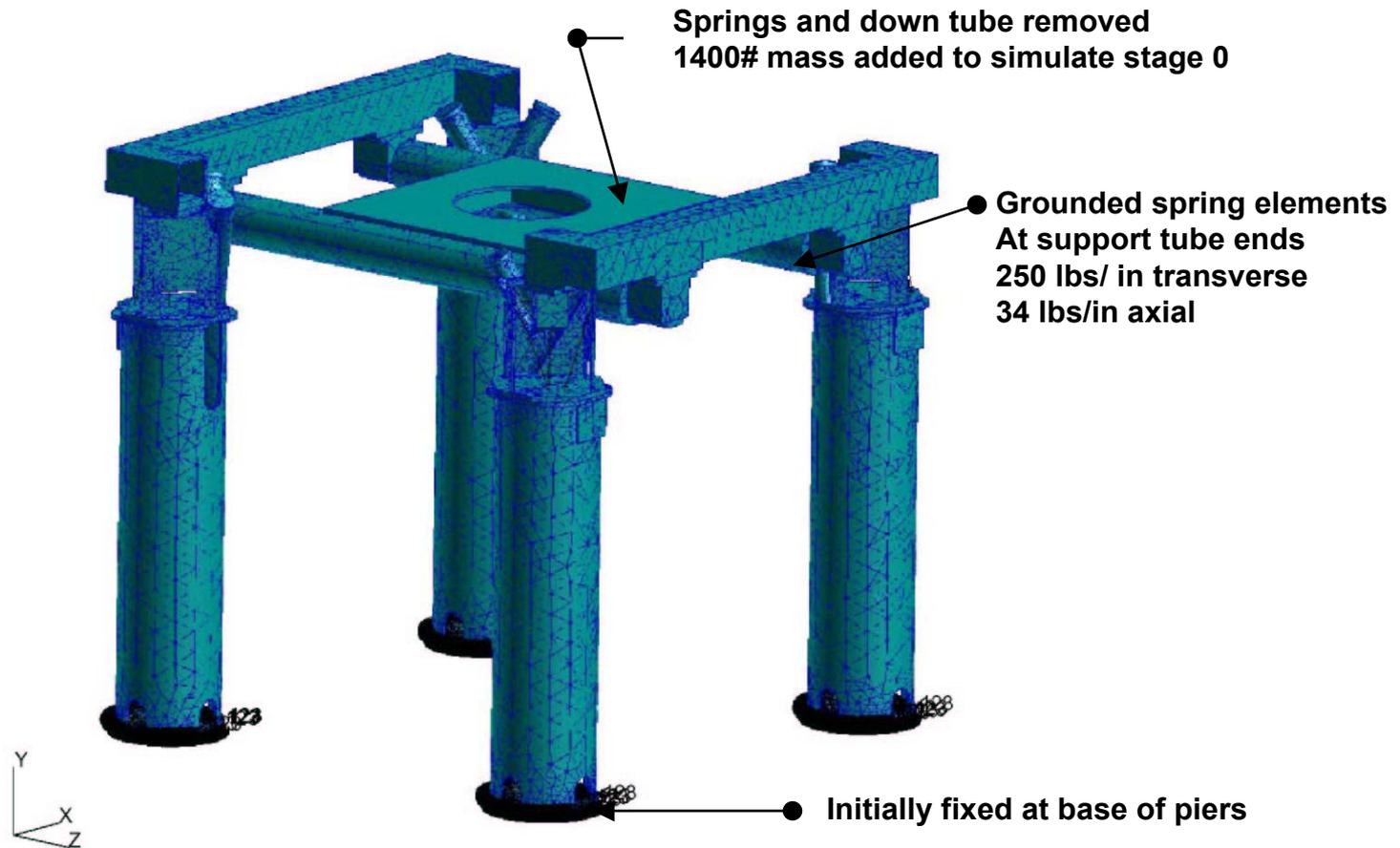
- Add cross bracing between piers?
- Other structural improvements

- **Check differences between LASTI and sites**

- Cement base is 10” thick at LASTI and 30” thick at LLO and LHO

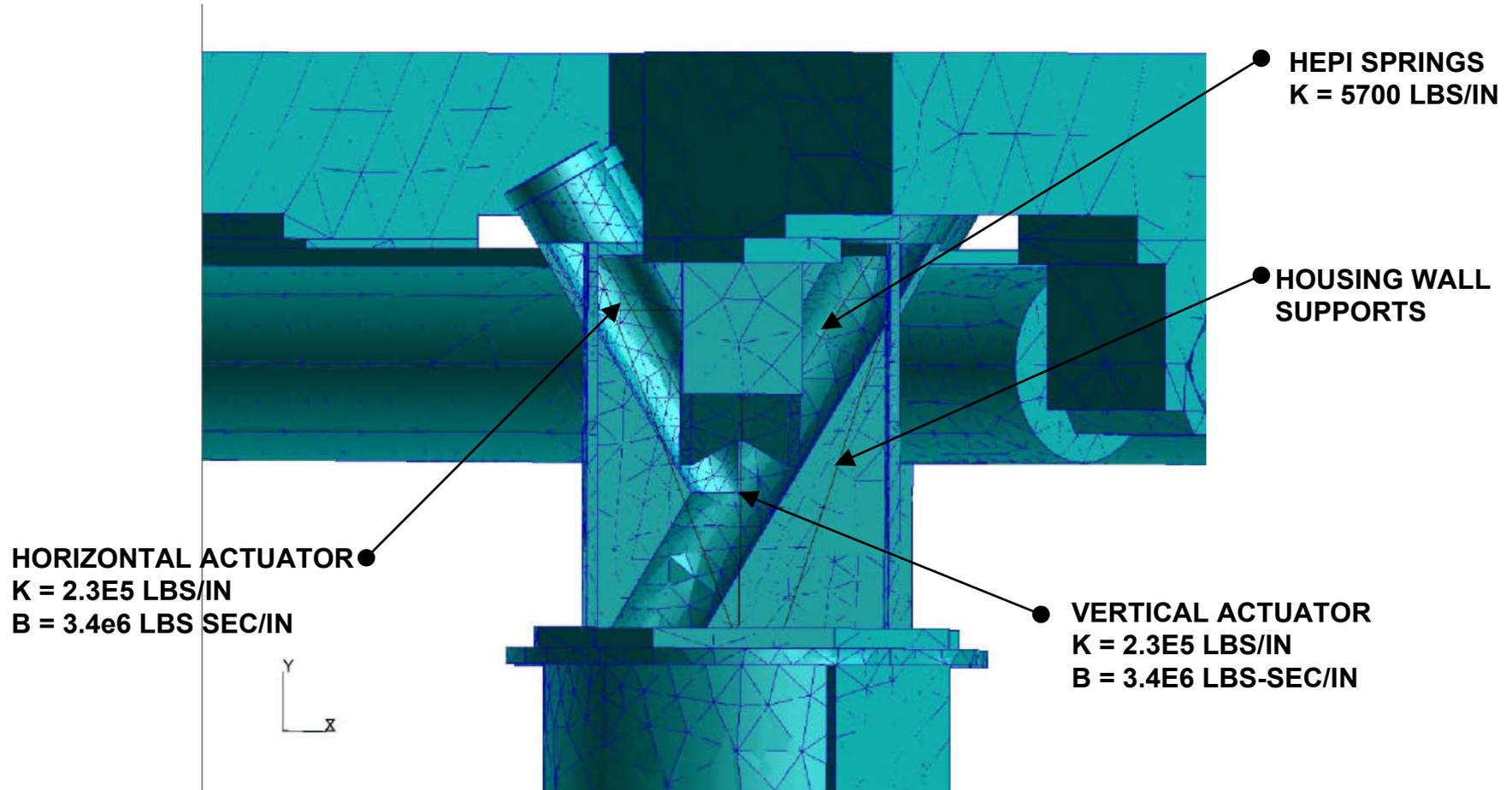
- **Model being built using MSC Patran and MSC Nastran finite element analysis**
 - » Has ability to calculate modes then read into frequency response analysis to generate transfer functions
 - » Line elements simulate actuators as a spring and damper
 - » Axial springs to simulate large HEPI springs
 - » Grounded springs and dampers to simulate bellows and other external parts
 - » FEA package used by ASI to model the advanced LIGO seismic isolation

MODEL CREATION

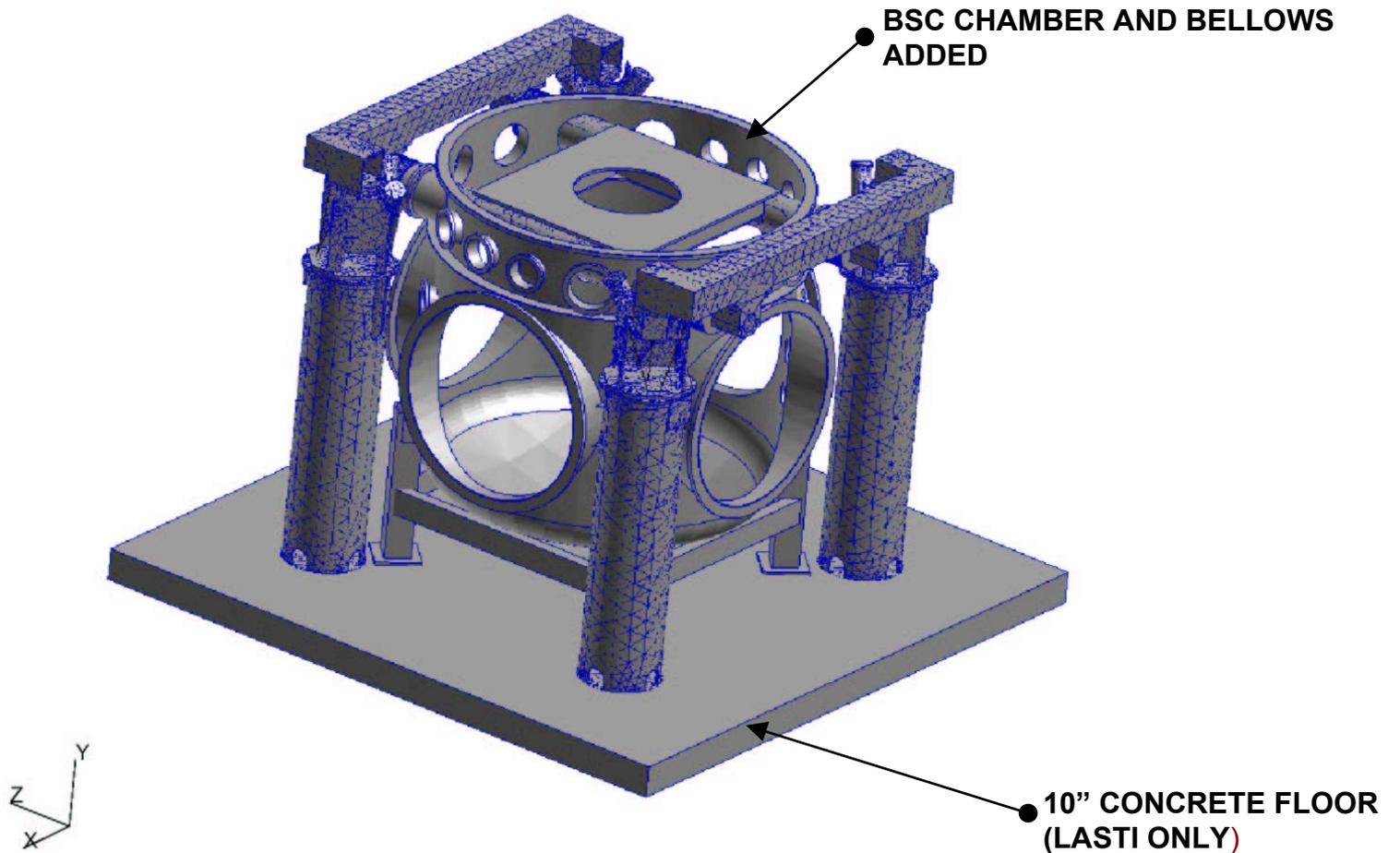


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ANALYSIS



ANALYSIS



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- **Model still in construction**

- » Initially built in Algor until it was discovered many of required features do not work
- » Node matching in Patran not automatic

- **Necessary in understanding behavior of structure**