Structural Model Status

July 27, 2011

Mass Debugging

- Mass provided by Boucke did not match Nastran FEM… why?
- The physical beam in Nastran is defined by shear centers.
- Nastran requires expects that Center of mass, bending center and shear center all lie in a plane that is perpendicular to the elemental beam axis connecting shear centers.
- First attempt was just modify the elemental densities by the ratio of total mass.

Eigenvalues and Weights for Beam FEM model

Description	Boucke's	ccs_o1_k_nsm1_NneM_nNM	ccs_o1_k_nsm1_nNM_modrho	ccs_o3_k_nsm1
		grids of beams original, offsets to shear center		grids of beams = center of mass, no account for Bending, shear center offsets
		NSM included in rho	NSM included in rho, modified density	NSM included in rho
1	25.33879547	26.39016	25.95115	25.86045
2	78.63642299	83.73869	82.34042	81.72039
3		118.8076	117.3857	117.5062
4		171.3843	168.1035	167.363
5		263.497	260.5431	259.2949
6		274.9971	272.3728	271.8174
7		280.5421	274.8908	276.339
8		387.3111	384.7303	378.7149
9		441.2884	440.4103	437.6894
10		506.6287	502.7613	499.8026
MASS	342.62	339.4723	342.6284	342.6284
XCG		0.2810102	0.2793829	0.2805913
YCG		-0.3737949	-0.3690779	-0.3699242

Suggestions made

- Look at one element finite element model, look at displacements with a load at the end to check out stiffness formulation of Nastran and Boucke
- Boucke doesn't like the idea – recommends we create a longer beam with constant properties with multiple elements. He is planning to generate the model and I will create a Nastran model from the data he provides
- Other suggestions from Castro follow next

SUGGESTIONS FOR CHECK OUT

- Castro updated the Nastran one element model to try to more accurately define the bending and mass grids.
- He somewhat succeeded but it's still not perfect. However, I think we are very close now so this should be close enough. Comparing these grids to your original model shows differences on the order of -4 so you were already very close.

  Last week Alexander was suggesting not necessarily comparing one element, but comparing a uniform beam of maybe 20 elements. That would be fine. However we compare, in the end, I think we should do the following until we understand exactly which terms in Nastran are causing the differences:

  1) Normal modes of beam with no shear center, bending or mass offsets. Check total mass, frequencies and mode shapes

  2) Normal modes of beam with shear center offset. Bending and mass axes located at shear center

  3) Normal modes of beam with shear center offset. Mass axis further offset from shear center. No offset for bending axis

  4) Normal modes of beam with shear center offset. Bending axis further offset from shear center. No offset for mass axis

  5) Normal modes of beam with shear center offset. Bending and Mass axes further offset from shear center.

  All the above can be repeated with linear statics and grav loads.

  Also, the test model should have the nodes aligned on the X axis of the default global coordinate system so that the CBEAM element coordinate system axes are parallel to the global coordinate system.

  By the way, I do not have a meeting notice for tomorrow. Please forward if possible. I will try to attend if I don't have a conflict.

SOLID ELEMENT MODELS

- Boucke working on getting cable weights and locations to add to Hex and TET models – status??