

**Magellan 6.5 Meter Telescopes Project**  
**Update of the Design and Analysis of the Nasmyth Instrument Guider Housing**

Steve Gunnels - October 29, 1999

CIW No. 99TM9722

The earlier report 99TM9721 determined approximate motions of the slit wrt the altitude disk due to an application of 1 g in the “-Z” direction. It therefore included motion due to compliance of the thick spacer and NIR disk. However, it did not include the orthogonal component of motion in the “X” direction (90° rotation in the gravity field defines both vector components). Since the guider mechanism will be mounted on a steel plate adjacent to the guider housing, it defines a more meaningful reference.

Model ECH34 was therefore created. It consisted of the earlier model ECH28 but without the NIR disk or thick spacer. The nodes representing the steel plate were fixed (translations only). The guider housing wall was modeled as 3/4" thick aluminum and later 1" thick aluminum. The model is shown on the attached graphics plot. The motion in the area of the model in close proximity to the slit was:

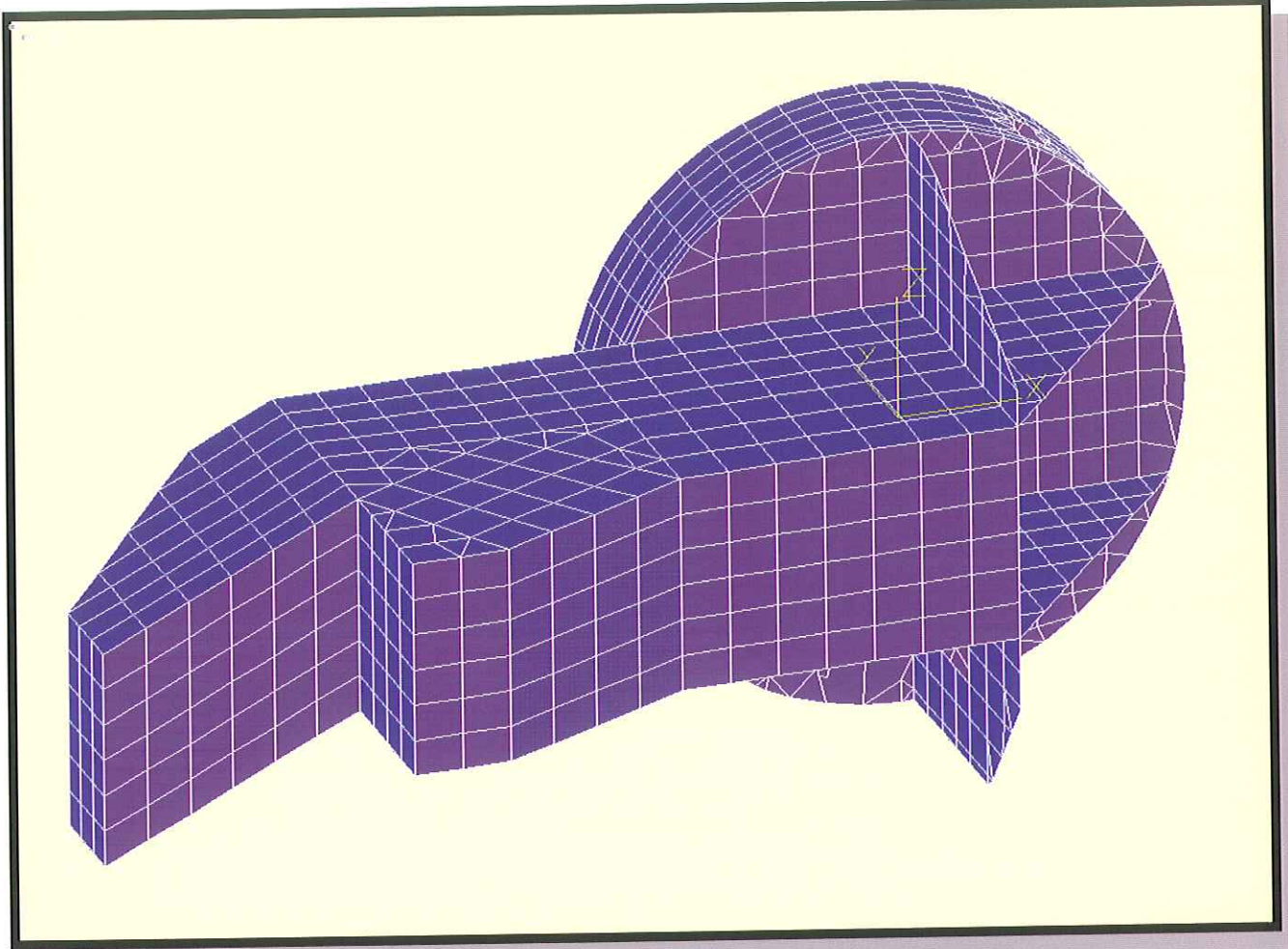
<b>Model ECH34 - Echelle plus Guider (only)</b>	
<b>Total motion of slit with respect to guider support plate due to 90° rotation in gravity field</b>	
3/4" thick aluminum guider housing	10.2 microns
1" thick aluminum guider housing	9.3 microns

It should be noted that, with the steel plate nodes fixed, the above motions include no allowance for compliance of the steel plate and guider mechanism. Since both the steel plate and guider housing are actually supported by the spacer (back toward the NIR disk), one could argue that the guider mechanism and housing/instrument structure act as two springs in parallel. Thus, it is possible that the guider mechanism compliance might actually *reduce* the relative motion between the guider mechanism and slit.

It should also be noted that the model in the area of the slit is only a crude representation of the actual structure. It consists of a single solid 3/4" thick aluminum plate spanning vertically between the main top and bottom “horizontal” plates of the structure (and extending beyond as large scarfed gussets). Thus, the out-of-plane bending motion due to “X” gravity is significant. The actual structure consists of a much thicker adapter plate which is further stiffened by the dewar housing. On the other hand, the very significant mass of the dewar itself is also not included in the model. Therefore, the above deflections should be considered only a rough estimate of the relative motion that will actually occur in the spectrograph.

It is concluded that the difference in motion due to the relatively large difference in wall thickness (1" vs. 3/4") is so small as to not be worthwhile. The guider housing will be made with a 3/4" thick aluminum wall.





**Model ECH34 - Echelle with Guider Housing**

