

SOFIA Lunch Talk

Date: Nov. 15 2004

Speaker: Ulrich Lampater

Title: “Modal Testing of SOFIA’s Coarse Balance Weights”

ABSTRACT:

SOFIA’s Coarse Balance System is used to place the telescope’s center of gravity in the bulkhead, allowing it to float in the hydraulic bearing without residual momentum. The system consists of 16 stacks of steel plates distributed around the SI flange, providing a modular system that is able to account for shifts in the center of gravity when different Science Instruments are attached to the telescope assembly.

Finite element simulations and the results of a preliminary modal survey test performed on the telescope assembly earlier this year proved that the dynamic properties of the telescope are sensitive to the preload applied to the coarse balance weight stacks. Furthermore, friction occurring between the plates causes nonlinearities that couple with telescope modes. As a consequence modal frequencies as well as mode shapes change in a frequency band between 40 and 100 Hz, including modes of the Primary Mirror Assembly.

The talk addresses tests of the dynamic properties of the coarse balance weight stacks performed at Ames under different boundary conditions such as preload and number of weights. Attempts to reduce crucial dynamic effects will also be discussed.