23.25

A HIPPARCOS-Like Catalog with the Hubble Space Telescope

L.M. Nagel and L.G. Taff (ST ScI)

The Fine Guidance Sensors will be used to control the precision pointing of the Hubble Space Telescope (HST) by acquiring and measuring the signals of two Guide Stars for every scientific observation. We propose to use these engineering acquisitions, coupled with the known distance between the two Fine Guidance Sensors (FGSs), to extract relative positions of all the Guide Stars used over the course of the HST's lifetime. Because the FGSs utilize a system of Koesters' prisms and photomultiplier tubes, they are not limited by HST's resolving power and can be expected to achieve precisions up to 0.003 arcseconds for stars with apparent visual magnitudes between 4 and 17. We hope to catalogue positions for Guide Stars in most of the sky by building up a database of positions, pair by pair, during the 10-15 years HST is observing. In the event that any "holes" in sky coverage should persist, we would develop a General Observer proposal to use HST during its final observing cycles in order to fill in the gaps, thereby creating a unique, all-sky, astrometric system of stars in the 9 to 14.5 visual magnitude range. The probability that this endeavor will be successful grows exponentially if the third FGS can be used in parallel with other scientific observing. The reduction of the data would proceed as planned for HIPPARCOS with an intimate tie to the Carlsberg Meridian Circle Catalogue a natural by-product.

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23.26

Status of the Flight Hardware and Ground System for Hubble Space Telescope Astrometry

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The Hubble Space Telescope guidance and astrometric instrument, the Fine Guidance Sensor, is reviewed. We will discuss 1) the instrument's interferometric design and its usefulness to astrometry, 2) the astrometric observing modes and the software commands used to implement them, and 3) the expected state of the spacecraft during an observation with respect to the line of sight jitter, drift, and guidance mode.

We present sample test data for the hardware now installed on the Hubble Space Telescope and report on the expected astrometric accuracy.

24.01

Sunspot Seismology

S. M. Chitre(1) and J. M. Davila (NASA/GSFC)

The interaction between the solar acoustic modes and a sunspot flux-tube is expected to provide a valuable diagnostic handle to probe the structure of a sunspot. The observed substantial amount of absorption of solar p-mode flux reported by Braun, Duvall and Labonte could, for example, be utilized to investigate the sub-surface spot layers.

We consider a simplified sunspot model with transverse gradients in the thermal and magnetic fields. The absorption of flux of incoming acoustic waves in a narrow resonance layer is investigated. The energy absorbed is estimated and compared with the observations.

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24.02

The Scattering of Solar P-Modes by Sunspots

J. Davila (NASA-GSFC) and K. Jensen (STX/GSFC)

Below the solar photosphere waves are energetically unimportant. Most of the energy is carried by the convective or radiative flux. However, waves in the convection zone can serve as powerful probes of the internal structure of the sun. Most of these studies have concentrated on the large scale properties of the solar interior. Recently however observations of the scattering of solar p-modes from sunspots have been made by Braun, Duvall and Labonte (1987). These observations present us with the opportunity to study the subsurface structure of active regions semi-empirically for the first time. A simple analytic model for the interaction of subsurface p-mode oscillations with the magnetic structure of the sunspot have been developed. This model will be compared with observations of the scattered wave modes. Calculations presented at the last meeting will be updated and new results presented.

24.03

Comparison of Sunspot Areas from the San Fernando Observatory's Cartesian Full Disk Telescope and Rotating Full Disk Photometer

A. D. Herszog, G. A. Chapman, and M. Gluckszak (SFU/CSUN)

Observation of the full disk of the sun have been obtained with two different instruments, the Rotating Full Disk Photometer (RFDP) and the Cartesian Full Disk Telescope (CFDT). Data are presented for these two instruments for an approximately three week period in the Summer of 1988 centered around the end of June. The two instruments have pixel sizes of 5 arc seconds. The CFDT produces a normal x-y image of the sun in a 512 x 512 pixel format. The RFDP obtains an image by rotating a linear diode array, oriented in a radial direction, around the solar image. The resulting image has 1320 records of 256 pixels and since it is oversampled near the center of the disk, a geometric correction factor must be applied to the RFDP data. Comparison of the sunspot areas from the RFDP and