the trajectory to the moon is consisted of the Earth departure loop trajectory and the Translunar trajectory. This method is useful not only to reduce the gravity losses but also to check the condition of satellite. By using this method, this paper demostrates the optimized trajectory from Earth parking orbit to lunar mission orbit which minimizes the fuel, and the SNOPT (Sparse Nonlinear OPTimizer software) is used to find optimal solution. Also, this paper provides lunar mission profile which includes the mission schedule when TLI, LOI (Lunar Orbit Insertion) maneuvers occur, a mount of fuel when thruster is used and other mission parameters.

[II-2-2] Geostationary Transfer Orbit Mission Analysis Software Development

Bang-Yeop Kim

Communication Satellite Systems Department
COMS Program Office, KARI

The Korean first geostationary meteorological satellite, COMS, will be launched during second half of 2009. For the next meteorological geostationary satellite mission, KARI is now preparing the development process and tools. As one of the endeavor, a software tool is being developed for the analysis and design of geostationary transfer orbit. Generally, these kind of tools should be able to do various analysis works like apogee burn planning, dispersion analysis, ground visibility analysis, and launch window analysis etc. In this presentation, a brief introduction about a design process and analysis software tool development. And simulated calculation results are provided for the geostationary transfer orbit. These software can be used for the next geostationary satellite mission design and development.

[II-2-3] YLPODS performance test using SLR data

Young-Rok Kim, Sang-Young Park, and Kyu-Hong Choi

Astrodynmics & Control Lab, Department of Astronomy, Yonsei University, Seoul 120-749, Korea

YLPODS (Yonsei Laser-ranging Precise Orbit Determination System) is POD system using SLR (Satellite Laser Ranging) data. YLPODS is developed for two main purposes. The first purpose is to verify the result of POD using GPS data. The second purpose is to perform POD using only SLR data. In this study, YLPODS performance test is presented for checking the reliability of POD using only SLR data. To perform POD, the information of CHAMP and TOPEX mission is applied and SLR NP (Normal Point) data is used. The test is performed by checking both range precision and 3D accuracy (radial, along, cross direction). To confirm of 3D accuracy, CHAMP GENESIS orbit and TOPEX JPL orbit of NASA are used.

[II-2-4] Development of a Preliminary Formation-Flying Testbed for Satellite Relative Navigation and Control

Jae-Ik Park, Han-Earl Park, Sun-Hwa Shim, Sang-Young Park, and Kyu-Hong Choi

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This research develops a GPS-based formation-flying testbed (FFTB) for formation navigation and control. The FFTB is a simulator in which spacecraft simulation and modeling software and loop test capabilities are integrated for test and evaluation of spacecraft navigation and formation control technologies. The FFTB is composed of a GPS measurement simulation computer, flight computer, environmental computer for providing true environment data and 3D visualization computer. The testbed can be simulated with one to two spacecraft, thus enabling a variety of navigation and control algorithms to be evaluated. In a formation flying simulation, GPS measurement are generated by a GPS measurement simulator to produce pseudorange, carrier phase measurements, which are collected and exchanged by the flight processors and subsequently processed in a navigation filter to generate relative and/or absolute state estimates. These state estimates are the fed into control algorithm, which are used to generate maneuvers required to maintain the formation. In this manner, the flight processor also serves as a test platform for candidate formation control algorithm. Such maneuvers are fed back through the controller and applied to the modeled truth trajectories to close simulation loop. Currently, The FFTB has a closed-loop capability of simulating a satellite navigation solution using software based GPS measurement, we move forward to improve using SPIRENT GPS RF signal simulator and space-based GPS receiver

[II-2-5] The Comparison of Numerical Integration Methods for the KASIOPEA, Part II

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Space Geodesy DIvision
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The completion ('initiation' de facto) of the KASI Orbit Propagator and Estimator (KASIOPEA) has been delayed for several reasons unfortunately. Due to the lack of working staffs and the Division priority rearrangement, the initial plan was dismantled and ignored for many years. However,

fundamental researches regarding the essential parts of KASIOPEA has been done by author. The numerical integration module of the KASIOPEA is the most sensitive part in the precision of the final output in general. There is no silver bullet in the numerical integration in an orbit propagation as a non-stiff ODE case. Many numerical integration method like single-step methods, multi-step method, and extrapolation methods have been used in overly populated orbit propagator or estimator. In this study, several popular methods from single-step, multi-step, and extrapolation methods have been tested in numerical accuracy and stability.

■ Session III-2 : Payloads 1
Wednesday, 22 October [16:30-17:30]

[III-2-1] Discussion of Preliminary Design Review for MIRIS, the Main Payload of STSAT-3

Wonyong Han[1], Ho Jin[1], Jang-Hyun Park[1], Uk-Won Nam[1], In-Soo Yuk[1], Sungho Lee[1], Youngsik Park[1], Sung-Jun Park[1,2], Dae-Hee Lee[1], Chang H Ree[1], Woong-Seob Jeong[1], Bongkon Moon[1], Sang-Mok Cha[1], Seoung-Hyun Cho[1], Seung-Woo Rhee[3], Jong-Oh Park[3], Seung-Heon Lee[3], Hyung Mok Lee[4], and Toshio Matsumoto[4,5]

[1]Korea Astronomy and Space Science Institute, [2]Korea Advanced Institute for Science And Technology, [3]Korea Aerospace Research Institute, [4]Seoul National University, [5]ISAS/JAXA

KASI (Korea Astronomy and Space Science Institute) is developing a compact wide-field survey space telescope system, MIRIS (The Multi-purpose IR Imaging System) to be launched in 2010 as the main payload of the Korea Science and Technology Satellite 3. Through recent System Design Review (SDR) and Preliminary Design Review (PDR), most of the system design concept was reviewed and confirmed. The near IR imaging system adopted short F/2 optics for wide field low resolution observation at wavelength band 0.9~2.0 um minimizing the effect of attitude control system. The mechanical system is composed of a cover, baffle, optics, and detector system using a 256 x 256 Teledyne PICNIC FPA providing a 3.67 x 3.67 degree field of view with a pixel scale of 51.6 arcsec. We designed a support system to minimize heat transfer with Muti-Layer Insulation. The electronics of the MIRIS system is composed of 7 boards including DSP, control, SCIF. Particular attention is being paid to develop mission operation scenario for space observation to minimize IR background radiation from the Earth and Sun. The scientific purpose of MIRIS is to survey the Galactic plane in the emission line of Paα (1.88 μm) and to detect the cosmic infrared background (CIB) radiation. The CIB is being suspected to be originated from the first generation stars of the Universe and we will test this hypothesis by comparing the fluctuations in I (0.9~1.2 um) and H (1.2~2.0 um) bands to search the red shifted Lyman cutoff signature.

[III-2-2] Tolerance Analysis of Compact Imaging Spectrometer (COMIS) for a microsatellite STSAT3

Eun-Sil Kim and Jun Ho Lee

Kongju National University

The STSAT-3 satellite was initiated in October 2006 and will be launched into a lower sun-synchronous earth orbit (~ 700km) in 2010. COMIS takes hyperspectral images of 30m/60m ground sampling distance over a 30km swath width. The payload will be used for environmental monitoring, such as in-land water quality monitoring of Paldang Lake located next to Seoul, the capital of South Korea. An extensive sensitivity and error budget analysis of COMIS optical system have been performed. As way of estimating aggregate effects of all tolerances, a Monte Carlo simulation is used.

[III-2-3] Simultaneous imaging and radiometric performance simulation for computer generated GOCI optical system with measured characteristics

Soomin Jeong[1], Yukyeong Jeong[1], Dongok Ryu[1], Jinhee Yoo[1], Seonghui Kim[3], Seongick Cho[4], Sun-Jeong Ham[1,2], HeongSik Youn[3], Sun-Hee Woo[3], and Sug-Whan Kim[1]

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In this study, we report a new Monte Carlo ray tracing technique for estimating GOCI (Geostationary Ocean Color Instrument) radiative transfer characteristics and imaging performance simultaneously. First, a full scale GOCI optical model was constructed with measured characteristics at the component level and placed in the geostationary orbit. An optical model of approximated GOCI target area centered at the Korean penninsular was then built using the USGS coastal line data and representative land and sea surface reflectivity data. The light rays launched from a simulated sun model travel to the Earth surface, where they are reflected and scattered. Some of the light rays that are headed to the GOCI model in the orbit were selected and