13th International Workshop on Laser Ranging
"Toward Millimeter Accuracy"

Abstracts Addendum

Scientific Achievements, Applications, and Future Requirements (R. Noomen and S. Klosko)

ORAL PRESENTATIONS:

The Development of NASA Gravity Field Models and their Dependence on SLR – Invited

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Satellite laser ranging data has been an integral part of Earth gravity model development since the days of the earliest GEM (Goddard Earth Models) in the 1970's. SLR data have contributed both directly in the form of tracking of the multiplicity of satellites that have made up these solutions, and indirectly in the definition and stabilization of the terrestrial reference frame. The evolution of the SLR technology required improvements in modeling and yielded ever-refined models. In this paper, we will review the contribution of SLR data, starting with the first generation laser systems in the early 1970's. The launch of Lageos-1 and its contribution will be highlighted. The intensive effort to develop an improved geopotential model prior to the launch of TOPEX/Poseidon will be reviewed. Finally we will provide some perspectives on the use of SLR data in current geopotential solutions with CHAMP data.

Timing Devices (E. Samain and P. Gibbs)

ORAL PRESENTATIONS:

WITHDRAWN: Portable - Pico Event Timer Upgrade

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To reach the millimeter satellite laser ranging accuracy the Portable - Pico Event Timer (P-PET, London) was upgraded to < 3 picoseconds jitter and advanced range gating. The capability to cooperate with the multi kilohertz laser ranging systems was added.

Improved or Upgraded Systems – Poster Session (F. Pierron and Y. Fumin)

POSTER PRESENTATIONS:

GUTS – A New SLR System for Japan

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Honeywell Technology Solutions Inc (HTSI) is currently integrating the Global High Accuracy Trajectory System SLR system for NASDA in the STALAS facility at the Goddard Geophysical and Astronomical Observatory. This system will ultimately be installed at the NASDA facility on Tanegashima Island in Japan. HTSI is manufacturing the SLR control system, electronics, optics, and aircraft warning radar system; producing and implementing the control, scheduling, and data processing software; integrating the NEC-manufactured laser and the Brashear-manufactured 1-meter telescope with our items; and preparing for collocation with the HTSI-operated NASA MOBLAS-7.

The GUTS SLR system will have the capability to range to satellites in orbits ranging from low Earth to geosynchronous. In addition, special modifications to the HTSI control software will allow the system to be operated remotely from the NASDA facility in Tsukuba via a low bandwidth data link as well as by a local operator at Tanegashima.

Initial integration testing of the system has produced outstanding results. Ranging to the calibration cube located on the system's optical table produces ranges with an RMS of ~2 mm. This is expected to be degraded to no worse than 2.5 mm when ranging is performed to the external calibration pier following the installation of the telescope.

HTSI would like to acknowledge the cooperation and support that we have received from NASDA (especially from Mr. Takashi Uchimura) and NEC (from the team led by Mr. Kaoru Asaba) in the implementation of this system.

Integration of 1.5m Telescope and ranging system in CRL

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Takuma Satoh, JAMCO Corp.

The Keystone stations (Miura and Tateyama) were dismantled and the 75cm telescopes were transferred to other institute in Japan. Laser and electronics were moved and integrated to Koganei (CRLLAS) 1.5m telescope as basis of conventional SLR system but without routine operation. We switch lasers between 50mJ/50ps 20Hz (high precision) and 200mJ/3ns/ 10Hz (high power) for requirement of various targets acquisition such as LRE or ADEOS-II. Multiple tracking cameras are used in different FOV (0.5arcdeg/2arcmin/50arcsec) and sensitivity (Mag.9-13). In addition to the conventional SLR system, we plan a next generation of laser ranging collaborated with optical communication by integrating CW laser with Pseudo-noise modulation and wideband correlator.

Advanced Systems and Techniques (B. Greene and T. Murphy)

POSTER PRESENTATIONS:

A satellite laser ranging system based on a micro-chip laser

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Presented by: Hiroo Kunimori

We have developed a micro-chip laser (MCL) that consists of a passive Q-switched Nd: YAG laser pumped by a fiber-coupled laser diode which can be used in the first generation of a compact satellite laser ranging (SLR) system. We focus on the pulse-timing jitter of the MCL. We report on the characteristics of the MCL and its integration with a current SLR system and also provide some preliminary results of experiments with our revised model. We are now developing a dynamic tracking system with a function of reducing the effect of timing jitter in the signal from a Q-sw laser to less than 1 us.