to 1.5 MeV. Our result can be applied to estimate solar cell conditions of other satellites.

[Ⅷ-1-8] Neutron Monitor as a New Instrument for KSWPC

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Cosmic ray (CR)s are energetic particles that are found in space and filter through our atmosphere. They are classified with galactic cosmic ray (GCR)s and solar cosmic ray (SCR)s from their origins. The process of a CR particle colliding with particles in our atmosphere and disintegrating into smaller pions, muons, neutrons, and the like, is called a cosmic ray shower. These particles can be measured on the Earth's surface by neutron monitor (NM)s. Regarding with the space weather, there are common types of short term variation called a Forbush decrease (FD) and a Ground Level Enhancement (GLE). In this talk, we will briefly introduce our recent studies on CRs observed by NM: (1) simultaneity of FD depending on solar wind interaction, (2) an association between GLE and solar proton events, and (3) diurnal variation of the GCR depending on geomagnetic cutoff rigidity. NM will provide a crucial information for the Korea Space Weather Prediction Center (KSWPC).

■ Session Ⅴ-2 : Orbit 2 / Payloads 2
Thursday, 23 October [10:00-11:15]

[V-2-1] Batch Unscented Transformation for Satellite Orbit Determination Using A Satellite Laser Ranging (SLR)

Kyoung-Seok Seo, Sang-Young Park, Eun-Seo Park, Young-Rok Kim, and Kyu-Hong Choi

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The batch least square filter is widely used for ground estimations. However, in orbit determination (OD) under inaccurate initial conditions and few measurement data the performance by the batch least square filter can lead an unstable results. To complement weak part of the batch filter, the batch unscented transformation without any linearization process is developed by ACL (Astrodynamics and Control Laboratory) in YONSEI University. In this paper, the batch unscented transformation is introduced and applied to satellite orbit determination using Satellite Laser Ranging (SLR) data. Only range of the satellite measured from ground tracking stations is used for measurement data. The results of simulation test are compared with those of the weighted batch least square filter for various initial states errors (position and velocity). Simulation results show that the batch unscented transformation is comparable or slightly superior to batch least square filter in the orbit determination.

[V-2-2] Real-Time Relative Navigation with Integer Ambiguity

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Relative navigation system is presented using measurements from a single-channel global positioning system (GPS) simulator. The objective of this study is to provide real-time relative navigation results as well as absolute navigation results for two formation flying satellites separated about 1km in low earth orbit. To improve the performance, more accurate dynamic model and modified relative measurement model are developed. This modified method prevents non-linearity of the measurement model from degrading precision by applying linearization about the states from absolute navigation algorithm not about a priori states. Furthermore, absolute states are obtained using ion-free GRAPHIC pseudo-ranges and precise relative states are provided using double differential carrier-phase data based on Extended Kalman Filter. The software-based simulation is performed and achieved meter-level precision for absolute navigation and millimeter-level precision for relative navigation. The absolute and relative accuracies at steady state are about 0.77m and 4mm respectively (3D, r.m.s.). In addition, Integer ambiguity algorithm (LAMBDA method) improves simulation performances.

[V-2-3] Improved Differential Wavefront Sampling algorithm for efficient alignment of Space optical system

Yunjong Kim[1,2], Ho-Soon Yang[2], Yun-Woo Lee[2], and Sug-Whan Kim[1]

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The significant I&T process gain represented by reduction in overall budget expenditure can be obtained from the use of efficient alignment technique for large space optical systems. Such process gain tends to increase rapidly with