(56%) and metric type II bursts (45%). Second, the SPE probability strongly depend on longitude: eastern (0%), center (45%), and western (33%) for X-class associated metric type II bursts, eastern (15%), center (55%), and western (17%) for X-class associated D-H type II bursts. eastern (17%), center (77%), and western (64%) for X-class associated m-to-km type II bursts. Third, for m-to-km type II bursts, the SPE probability increases with CME speed: 400km/s<5V <1000km/s (36%), 1000km/s<5V (<1500km/s (40%), 1500km/s<5V (66%). Finally, we expect that these results will be used for setting up more reasonable solar proton event forecasting models.

[VI-1-2] Relationship between plasma flows and the near-Earth tail dipolarizations
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The magnetic dipolarizations at the tail are often, if not always, associated with plasma flows of some magnitude. The associated flow direction is known to be earthward most often but not necessarily always. It is the primary goal of this paper to clarify the association between dipolarizations and the associated flow characteristics in general, but with a primary emphasis on tailward flow cases. Based on a number of dipolarizations that we identify at the near-Earth tail using the THEMIS tail observations we first confirm that dipolarizations can in general initiate in association with both earthward and tailward flows. Also, the main direction of the plasma flow, whether being earthward or tailward, is not critical in determining the intensity of the dipolarizations. We actually identify some events of tailward flow-associated dipolarizations that are as much intense as the earthward flow-associated events. The occurrence rate of the tailward flow-associated dipolarizations is mainly concentrated in the radial region of <10 RE and in the local time region of 22-01 hr. However, its relative occurrence rate is rather low, ~19% in the radial region and ~15.3% in the local time region, as compared to that for the events associated with all other types of flows. Furthermore, the flow direction often changes no matter whether it is initially earthward or tailward near the onset time. As a consequence, the net transport of the magnetic flux during the main duration of the dipolarization process is earthward for nearly all of the dipolarizations that initiate with dominantly tailward flows near the onset, as is the case for those that initiate with dominantly earthward flows.

[VI-1-3] Kinetic Properties of Plasmas at Earth's Bow Shock
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Earth's bow shock is a transition layer across which properties of plasmas change irreversibly. Although some features of the bow shock are well described by continua of fluxes of various macroscopic quantities, particle dynamics across the transition layer is very complicated. Observed phase space distributions show multiple ion beams and partially thermalized ions around the transition layer. In some cases, both hot magnetosheath ions and cold solar wind ions simultaneously exist in the magnetosheath. Electrons around the transition layer usually have flat-top distributions with temperature anisotropy. From the observed properties of the phase space distributions we will discuss thermalization processes that occur across the shock transition.

[VI-1-4] PIC simulation study of the turbulence of the Alfvén ion-cyclotron waves induced by electromagnetic ion-cyclotron instability
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The turbulence in the nonlinear regime of the electromagnetic ion-cyclotron (EMIC) instability is investigated via a particle-in-cell (PIC) simulation. EMIC instability arises from anisotropic ion temperature and excites the Alfvén ion-cyclotron (AIM) waves. The excited AIM waves undergo inverse-cascade via the nonlinear wave interaction of two AIM and one ion density modes. Induced ion density modes are the normal and second harmonic ion-acoustic (IA) waves. They have the same group velocity, but the second harmonic IA mode only generates the longitudinal electric field.

[IV-2-1] GMT 부경 FSM의 시험모델 개발 현황
1김영수, 박귀중, 고주현, 장정균, 양호성, 김호상, 이경돌, 안호성, Myung Cho, 경재만, 박병권, 현무영, 윤양노
1한국천문연구원, 2한국표준과학연구원, 3고등기술연구원, 4광주과학기술원, 5NOAO

한국천문연구원은 Giant Magellan Telescope (GMT)의 부경 중의 하나인 Fast Steering Mirror (FSM)의 시험모델을 개발 중이며, 구동 1.06m의 비특비구름 사방성을 실험체격하기 위하여 경량화 설계를 하고 실제 가공 준비를 하고 있다. 사방성의 tip-tilt 제어를 위해서는 mathematical model을 작성하고 실제 test-bed를 제작하였다. 이 논문에서는 FSM 시험모델의 개발
In this report, we present in-orbit radiometric performance prediction for the Amon–Ra (Albedo Monitor and Radiometer) energy channel instrument. The Integrated Ray Tracing (IRT) computational technique uses the ray sets arriving at the Amon–Ra instrument aperture orbiting around the L1 halo orbit. Using this, the variation of flux arriving at the energy channel detector was obtained when the Amon–Ra instrument including the energy channel design observes the Sun and Earth alternately. The flux detectability was verified at the energy channel detector (LME–500–A, InfraTecTM). The detector time response and RMS signal voltage were then derived from the simulated flux variation results. The computation results demonstrate that the designed energy channel optical system satisfies the in-orbit detectability requirement. The technical details of energy channel instrument design, IRT model construction, radiative transfer simulation and output signal computation results are presented together with future development plan.

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We present construction of 3D Earth optical Model for in-orbit performance prediction of L1 halo orbiting earth remote sensing instrument: the Albedo Monitor and Radiometer (Amon–Ra) using Integrated Ray Tracing (IRT) computational technique. The 3 components are defined in IRT: 1) Sun model, 2) Earth system model (Atmosphere, Land and Ocean). 3) Amon–Ra Instrument model. In this report, constructed sun model has Lambertian scattering hemisphere structure. The atmosphere is composed of 16 distributed structures and each optical model includes scatter model with both reflecting and transmitting direction respond to 5 deg. intervals of azimuth and zenith angles. Land structure model uses coastline and 5 kinds of vegetation distribution data structure, and its non-Lambertian scattering is defined with the semi-empirical “parametric kernel method” used for MODIS (NASA) missions. The ocean model includes sea ice cap with the sea ice area data from NOAA, and sea water optical model which is considering non-Lambertian sun–glint scattering. The IRT computation demonstrate that the designed Amon–Ra optical system satisfies the imaging and radiometric performance requirement. The technical details of the 3D Earth Model, IRT model construction and its computation results are presented together with future–works.

[IV-2-3] In-orbit performance prediction for Amon-Ra energy channel instrument
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한국천문연구원은 Giant Magellan Telescope Fast Steering Mirror Prototype의 반사경 Cell 초기설계 및 해석을 개발 중이고, 반사경 제작과 Tip–Tilt 시스템 제작을 목표로 하고 있다. 반사경은 지름이 1.06m, 두께가 약 140mm, 질량이 약 100kg인 meniscus 타입인 비측 비구면 반사경이다. Tip–Tilt 시스템은 바람에 의한 반사경의 진동과 망원경의 tracking jitter를 보정하기 위한 장치로 반사경을 작동시키는 역할을 한다. 이 논문에서 본 반사경의 초기설계와 반사경 cell에 발생할 수 있는 하중 조건에 따른 응력 및 변형, 반사경 cell의 두께에 따른 고유진동수를 해석한 결과들에 대해 논한다.