Tolerance Study of FIMS Optical System and its Environmental Consideration

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We present the design procedure and the performance estimation of the FIMS (Far ultraviolet Imaging Spectrograph) which is proposed for the observations of aurora, day/night airglow and astronomical objects onboard KAISTSAT-4. As a preliminary work which should be done before the fabrication of FIMS, we perform optical design and estimation, and determine the allowed range of manufacturing error based on possible degradation of FIMS performance which can occur before or after the fabrication. Tolerance study, an important procedure in optical design, is cross-checked to prevent error by wave-front aberration and ray-trace method which follows the way where light propagate. And, we propose possible shapes of substrate considering manufacturing methods and the costs. Finally, optical degradations from environmental effects when the FIMS is located in the proposed sun-synchronous orbit are considered using published results.