

A Study on Analytical Simulation Method for KPS Signal Design

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Abstract

As the use of applications using Position, Navigation, and Timing (PNT) service is deeply involved in modern life, PNT service technology based on Global Navigation Satellite System (GNSS) is becoming the core of national infrastructure network. After successful operation of United State Global Position System (GPS), space powers such as Russia, Europe, China, Japan, and India recognize the importance of GNSS technology and are steadily working on building their own satellite navigation systems. Also they modernize their existing systems to improve the system service performance. Recently, South Korea also begins internally to discuss on a development plan for its own satellite navigation and positioning system, so called Korea Positioning System (KPS), with the goal of 2034 (GPS World 2018).

In order to develop GNSS independently, a proprietary GNSS signal design technology is necessary in addition to satellite and ground station construction technology. The GNSS space powers are using their own signals and steadily working on designing new signals for better performances as a part of system modernization. The GNSS signal design aims to ensure signal performance that meets the service requirements to be provided. The GNSS signals are basically composed of carrier wave, spreading codes, and navigation messages. The characteristics of the designed signals are determined according to how to set the parameters for each component. Therefore, when designing a new GNSS signal, the proper concept of the signal design parameters should be defined in the early signal design stage. Also, it is necessary to select and analyze figures-of-merit (FoMs) to quantify the performance of the designed signal. In other words, the GNSS signal design process should include a quantitative evaluation and analysis based on FoMs according to the adjustment of the signal design parameters. This process can be easily performed through an analytical simulator based on the relationship between signal design parameters and FoMs. Therefore, this study introduces an analytical simulator based on the relationship between signal design parameters and FoMs developed for future KPS signal design, and presents the simulation results.

Keywords: *GNSS, signal figure of merit, signal design parameter, analytical simulator*

References

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Biography

Kahee Han is a Ph.D. student in the Department of Future Vehicle Engineering at INHA University, South Korea. She received B.S. degree in Electronic Engineering and M.S. degree in Electrical Engineering from INHA University in 2017 and 2019, respectively. Her research interests include GNSS signal design, Assisted-GNSS and digital communication.