

A study on numerical simulation tool for GNSS signal design in Korea

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Abstract

The US Global Positioning System (GPS) provides Position, Velocity, and Time (PVT) services that are one of the key elements in modern human life. The Global Navigation Satellite System (GNSS) composed of other satellite-based navigation systems developed by several other space power countries has become a core infrastructure of a country for about 20 years and has already been used universally in public as well as private sector. South Korea recently announced that they aim to develop their own satellite-based navigation system, so-called Korea Positioning System (KPS), by 2034 based on its proprietary technology. (GPS World, Feb 5, 2018).

The issue of navigation signal design is one of the most important factors in developing a new satellite navigation system. Development of new navigation signals should proceed more carefully and accurately, as multiple systems from different countries in a limited band. The designed signals must coexist and meet interoperability and compatibility at the same time. In addition, since the structure of the navigation signal has a considerable influence on the specification of the receiver and the navigation performance after the signal processing, the Figure of Merits (FOMs) for the navigation signal should be analyzed through simulation. Although the FOMs may be calculated theoretically, there may be a difference from the actual numerical implementation result, and some of the FOMs are not easy to be obtained analytically. Therefore, it is necessary to develop an end-to-end numerical simulator for generating the signals, considering the channel effect, transmission, and processing in the receiver.

This presentation discusses the development of numerical simulation tools for KPS signal design. The structure of each part of the simulator composed of signal generation, channel, and receiver is presented, and important FOMs obtained at each step is described. In addition, simulation results for basic example scenarios are analyzed using the prototype of the simulator developed so far.

Keywords: *Signal design, Figure of Merits, Numerical Simulator, Korean Positioning System, Global Navigation Satellite System*

References

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- [2] GPS World Staff, 2018, Korea will launch its own satellite positioning system, GPS World, 5 February

Biography

Heon Shin is a M.S. student in the Department of Electrical Engineering at Inha University, Korea. He received B.S. degree from Inha University in 2018. His research interests include GNSS signal design.