

Scientific and Engineering Approaches of Study Courses Based on The GNSS-RTK/PPP Technology

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SUMMARY

Global Navigation Satellite Systems (GNSS) are the basis for determining the coordinates of objects of various classes and purposes. Modern multi-system, multi-frequency equipment operating with the use of GLONASS, GPS, GALILEO, BEIDOU, QZSS, IRNSS signals, SBAS wide-gap add-ons (SDCM, WAAS, EGNOS, MSAS, GAGAN) provide post-processing positioning with the accuracy of 2.5 mm + 0.5 ppm and up centimeter accuracy in Real Time Kinematic mode. The prospect of further development of spatial coordinate support using orbital satellite constellations is an intensively developing method of high-precision autonomous coordinate positioning of objects using precise ephemeris and time-frequency parameter corrections (FDPs) of time scales (PPP). Over time, the above method has proven to be a powerful tool for geodetic and geodynamic applications. Although the accuracy obtained as a result of its application is quite similar to that got in the static mode of the relative method of satellite geodesy, the results of the method can be improved by using the technique of the phase ambiguity integer resolution.

In recent years, GNSS and satellite-based augmentation systems (SBAS) have widely been applied in the land survey areas, such as engineering, cadastre, resources management, urban planning, landscape construction, field mobile worker, high precision agriculture, monitoring deformation, and so on. Keeping up with the times, the Moscow State University of Geodesy and Cartography focused on providing high-class specialists in these areas.

Starting from the last decade, GNSS positioning had become one of the main subjects of higher educational study courses thanks to the rapid development of satellite-based positioning and to the appearance of GNSS mass-market receivers and antennas.

During the GNSS course study, students are welcome to participate in scientific researches within

the GNSS technology area application. The newest trends, such as moving base, ionosphere modeling, GNSS/IMU, and PPP/RTK methods for high-precision positioning using datasets collected from mobile devices, are utilizing capabilities of modern hi-tech equipment of the university giving the best start for the student to become a not only qualified engineer but young scientist as well.

This presentation describes the progress of the application and shows the feasibility and practicality of new GNSS-RTK/PPP technology study courses at the Russian Moscow State University of Geodesy and Cartography.

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