

Precise Point Positioning Using Combined GPS and GALILEO Observations

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SUMMARY

Precise Point Positioning (PPP) has been carried out using dual-frequency ionosphere-free linear combinations of carrier-phase and pseudorange GPS measurements. Dual-frequency GPS PPP technique has been proven to be capable of providing positioning solutions at sub-decimeter level in static positioning. This is achieved through rigorous modeling or estimation of all errors and biases. This paper takes the benefits of the newly launched Galileo satellites to produce a combined GPS/Galileo PPP solution. In addition to the traditional GNSS errors, integration of GPS and Galileo systems introduce additional biases that have to be modeled. These include Galileo hardware delays, GPS/Galileo time offset (GGTO), and different reference frame offset. Hardware delay exists in both satellites and receivers while GGTO and reference frame offsets exist due to the fact that Galileo and GPS systems use different time and reference frames. This paper shows that sub-decimeter level accuracy of the combined PPP solution and 20% improvement in the convergence time.