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DESIGN AND IMPLEMENTATION OF SINGLE FREQUENCY RTK POSITIONING FRAMEWORK

Abstract

Single-frequency receivers occupy more than 60 percent share of current GNSS receiver market.Paired with the demand of higher positioning accuracy for commercial users, much attention is directed towards carrier-phase based differential positioning algorithms for single frequency receivers, to provide accurate and precise navigation solutions for the mass market. Single frequency differential positioning is expected to be the leading technology for a wide range of applications ranging from geomatics, precision agriculture, location based services, internet of things to mHealth. This paper presents the design and implementation of a snapshot RTK positioning solution, using single frequency measurements only. The framework can be divided in three blocks. Each of the block applies Least Squares estimation per epoch to obtain rover receiver's position. The design is tested for both static and kinematic data. The positioning results are validated against those obtained from RTKLIB and CSRS-PPP. It is seen that the results tally within centimeter level. However, the positioning accuracy deteriorates once carrier-phase cycle slips occur. This is catered for by using a Hatch Filter based cycle slip detection algorithm which ensures that CS corrupted measurements are eliminated thus maintaining position accuracy. The framework can also serve as a test bench to design and test algorithms targeted towards single frequency RTK positioning.