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APPLICATION RESEARCH OF PHMI DYNAMIC ALLOCATION BASED ON VFODP THEORY IN RAIM ALGORITHM

Abstract

The FAA (Federal Aviation Administration) formed a panel with an objective to evaluate GNSS based architectures to provide robust LPV-200 service worldwide circa 2020–2025. One of a few architectures considered by the panel relies on Receiver Autonomous Integrity Monitoring (RAIM). In the 2020 to 2025 time frame, it is expected that a dramatically improved capability for modernized GPS will be available which will include multiple frequency civil signals available on the satellites and possibly a larger number of satellites. RAIM could be a viable means to provide worldwide LPV-200 service. In order to improve the availability of RAIM algorithm, a novel RAIM availability analysis algorithm based on PHMI (the probability of hazardously misleading information) dynamic allocation was presented. We first describe performance requirements and assumptions. We then develop RAIM formulas based on these requirements and assumptions. The formulas are developed using two approaches. One is an approach in which the integrity risk, i.e., the PHMI is equally allocated among different satellite integrity failures. All existing RAIM methods have taken this approach. The other is a new approach in which PHMI is freely allocated among different satellite integrity failures in order to achieve a higher RAIM availability. By analyzing the limitation of conventional RAIM algorithm in which the integrity risk, then based on anatomizing all kinds of factors, which influence the protection level of position error, schemed out PHMI VFODP (Variable Fuzzy Optimization Dynamic Programming) allocation scheme, which based on the contribution of every satellite supplies to position error. The simulation to verify the availability and validity of the proposed method with the actual GPS ephemeris data was carried out, and the simulation results show that PHMI dynamic allocation reduces the estimate of PL in availability analysis availably, for this reason, it improves the availability of RAIM algorithm, and these researches can afford references for restraining RAIM holes availably and selecting the optimization flying route guidance.