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CARRIER PHASE-BASED RAIM USING A GAUSSIAN SUM FILTER

Abstract

Pseudorange-based RAIM (PRAIM) has been investigated for many years and is used in various applications. However, for high accuracy applications, it has a limitation because the noise levels of pseudorange measurements are fairly large. In this case, we can use carrier phase measurements and should use a carrier phase-based RAIM (CRAIM). Conventional CRAIM algorithms have been used by direct extension of PRAIM and assumed a Gaussian measurement error distribution. However, the carrier phase error does not follow the Gaussian distribution perfectly, and therefore the performance of a conventional CRAIM algorithm is degraded. To address this problem, we propose a new CRAIM algorithm using Gaussian sum filters. A Gaussian sum filter can deal with any system nonlinearity or noise distribution, and accurately present the posterior distributions of states. In this paper, a Gaussian mixture parameter optimization technique is introduced and a detailed CRAIM algorithm using a Gaussian sum filter is described. Simulation results show that the proposed algorithm detects about 25