

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
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A MULTIPLE GPS ANTENNAE AND MEMS BASED INS INTEGRATED ATTITUDE
DETERMINATION SYSTEM

Abstract

The paper describes the attitude determination system via tight integration of multiple GPS antennae and MEMS based INS. The multiple GPS antennae system can provides attitude via using integer ambiguity solved carrier phase measurement. However, it has problem of the low output rate, latency, and easily lose lock problems. Low-cost MEMS based INS has problems of determining heading and error accumulation. The major objective is to design and implement the reliable attitude determination with high accuracy, high output rate, low latency, quick initialization, robust and redundancy via data fusion of multiple GPS antennae system and the MEMS based INS. The system can provide attitude and other navigation information even without GPS measurements for period of time. Performance analysis shows that the attitude, position, velocity, acceleration, and angular rates are estimated at 200Hz with accuracy(standard deviation) of 0.08 deg/s, 1.5m,0.1m/s, 0.12m/s²,and 0.1 deg/s The paper presents the methodology of the technique and performs the analysis based on the methodology.