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# A SPACECRAFT RELATIVE NAVIGATION ALGORITHM BASED ON QUASI-MEAN ORBIT ELEMENT DIFFERENCES

**Abstract**

A sapcecraft relative navigation strategy is discussed where the desired orbit is prescribed in terms of quasi-mean orbit element differences. This strategy is designed for spaceborne radar which can provide measurements including range,range rate, angle and angle rate. The state transform equaton that takes the quasi-mean orbit element differences as state variable is established with the J2 and atmospheric pertubations considered. The mapping matrix between local Cartesian coordinates and quasi-mean orbit element differences including the mean anomaly difference is developed based on Kyle T. Alfriend's theroy. The local Cartesian coordinates are treated as direct measurements instead of range and angle, and corresponding self-adjusted measurement err covariance is designed. In this case, the complex partial differentials of the state variable to measurement variable can be avoided. The validity of this method is provided by the simulation results.