

Screen Method of Distributed Cooperative Navigation Factors for Unmanned Aerial Vehicle Swarm

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Abstract : Aiming at the problem of factor screen in distributed collaborative navigation of dense UAV swarm, an efficient distributed collaborative navigation factor screen method is proposed. The method considered the balance between computing load and positioning accuracy. The proposed algorithm utilized the factor graph model to implement a distributed collaborative navigation algorithm. The GNSS information of the UAV itself and the ranging information between the UAVs are used as the positioning factors. In this distributed scheme, a local factor graph is established for each UAV. The positioning factors of nodes with good geometric position distribution and small variance are selected to participate in the navigation calculation. To demonstrate and verify the proposed methods, the simulation and experiments in different scenarios are performed in this research. Simulation results show that the proposed scheme achieves a good balance between the computing load and positioning accuracy in the distributed cooperative navigation calculation of UAV swarm. This proposed algorithm has important theoretical and practical value for both industry and academic areas.

Keywords : screen method, cooperative positioning system, UAV swarm, factor graph, cooperative navigation

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