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RESEARCH ON SMALL SATELLITE FORMATION INTER-SATELLITE MEASUREMENT AND  
COLLABORATIVE CONTROL

**Abstract**

With the development of space applications, many space missions require multiple spacecraft work collaboratively by formation flight to construct large aperture and long observation baseline, and to obtain information from different positions and angles at the same time. Collaborative and autonomous ability is the basement of formation flying mission. This paper presents a control architecture of small satellite formation flying mission and provides a master-slave collaborative control method to independently realize small satellite formation initialization as an example. Inter-satellite relative measurement and communication is necessary for autonomous and collaborative work of satellites formation. In order to satisfy the mass and volume requirements of small satellite equipment, this paper provides an integration solution to combine the inter-satellite relative measurement and communication function into a single device by integrative utilization of differential GPS based technology and pseudo code spread spectrum inter-satellite relative measurement technology. A prototype of this integration solution has been made and works effectively. Small satellite simulators have been made to demonstrate the inter-satellite measurement and collaborative control results on ground. The simulator consists a wheel based mobile platform with the feature of zero turning radius, and carries on board computer(OBC) and integrated inter-satellite relative measurement and communication device as test payloads. With such simulators, supporting by computers and visual monitoring equipments, an indoor small satellites autonomous collaborative control test bed has been built. The test bed has been proved to have the character of modular configuration, easy constructing and maintenance.