

IAF SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)Author: Mr. run Li
Harbin Institute of Technology, China, lirun@hit.edu.cnON-ORBIT ASSEMBLY OF LARGE MODULAR SPACE STRUCTURES WITH A
FORMATION-FLYING CLUSTER OF SMALL SPACE ROBOTS**Abstract**

Large space structures such as solar power space station and large aperture space telescopes are proposed to be constructed in space due to the lifting capacity and fairing size of current launch vehicles. It's impossible to stow all module monolithic components into a single fairing and to carry out the complex deployment in space. Rapid progress on formation-flying techniques makes it possible to configure ten or more small satellites in precise formation, maintaining position keeping and configuration reformation between each robotic agent while cooperation technology makes it feasible to transport and assemble components. This paper dovetails small satellite formation-flying techniques and cooperation technology widely demonstrated on terrestrial robot to propose a innovative architecture for on-orbit assembly missions. Optimal formation configuration is derived for assembling large round shape structures, dynamics of small space robot is analyzed, and control methods for cooperative operations between each agent is proposed. A conceptual of 50-meter diameter modular space structure is presented and the assembly strategy is simulated.