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ASTROBATIC: A HOPPING-MANEUVER EXPERIMENT FOR A SPACECRAFT-MANIPULATOR
SYSTEM ON BOARD THE INTERNATIONAL SPACE STATION**Abstract**

Hopping is proposed as an alternative mobility approach for intra and extravehicular orbital robotic activities by a spacecraft-manipulator system. In a hopping maneuver a spacecraft uses a robotic manipulator to execute a hop between two locations on the surface of a host spacecraft. A hopping maneuver is composed of three distinct phases: a manipulator-assisted push, a free-flying or free-floating coast, and a manipulator-assisted soft-landing. A detailed formulation of the dynamics, guidance and control of a three-dimensional hopping maneuver for a spacecraft-manipulator system is here presented. By using this formulation, a hopping maneuver for the NASA Astrobee platform free-flyer is designed, simulated and experimentally validated on a floating spacecraft simulator test-bed. Finally, the on-orbit experiment ASTROBATIC, manifested to fly on the ISS during 2019, is presented here which will test a spacecraft-manipulator hopping maneuver in microgravity on the International Space Station by using the NASA Astrobee platform.