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COOPERATIVE OBSTACLE AVOIDANCE OF A NEW MULTI-NODE FLEXIBLE LANDER FOR ASTEROID LANDING

Abstract

Asteroids have the characteristics of noncooperative, weak gravity, complex obstacles on the surface and weak light, which will cause difficulties in probe avoiding obstacles and landing. A new type of multi-node flexible lander is proposed. It is hoped that through the configuration of multiple nodes, the flexible connection can be used to dissipate landing energy mutually, and the weak gravity can be overcome to achieve robust landing; However, this configuration also brings new challenges, especially the coordination of multiple nodes under non-uniform constraints. For this new multi-node probe, a complete obstacle avoidance scheme is proposed, including three parts: virtual center based multi-node collaborative path planning strategy, obstacle avoidance potential field construction, and nodes tracking controller design. The new probe can deal with the distribution of complex obstacles in the surface and achieve accurate landing at fixed points. Finally, the simulation results are presented to verify that the proposed obstacle avoidance scheme can effectively reduce the obstacle avoidance of the new multi node flexible lander.