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INNOVATIVE RELAY HAZARD DETECTION AND AVOIDANCE STRATEGY FOR FUTURE CHINA AUTONOMOUS SAFE PLANETARY LANDING

Abstract

In order to obtain more scientific return, a growing number of planetary landing missions are taken into account and executed successively. Autonomous hazard detection and avoidance (AHDA) is one of the key technologies for future Chinese Moon sample return and Mars landing missions. Due to the long communication delay induced by the large distances between the target planet and base stations on the earth, together with poor capability of traditional planetary landing Guidance Navigation and Control (GNC) system, all deep-space landers to date have no capability of autonomous hazard detection and avoidance during landing period, except for Chinese Chang'e-3 lunar lander. In this paper, we will report the latest progress on planetary autonomous hazard detection and avoidance technologies in China. The innovative autonomous relay hazard detection and avoidance strategy applied in Chang'e-3 lunar soft landing mission and its flight results will be elaborated. However, uncertain gust and sandstorm during landing period on a Mars-like planet with an atmospheric layer will result in complex dynamics and low visibility, which brings new challenges to the existing AHDA scheme. So we will address the development of the AHDA strategy and some improved techniques in this region to be competent for future Chinese Mars landing mission, including onboard GNC system configuration architecture and autonomous hazard detection and avoidance algorithms, etc.