

Exploration of Near-Earth Asteroids (4)
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RESEARCH ON JUMPING ROBOT FOR ASTEROID DETECTION IN MICROGRAVITY
ENVIRONMENT

Abstract

Asteroid exploration is one of the frontier topics in contemporary deep space exploration. Asteroid exploration can provide clues and evidence for the formation and evolution of the solar system. The organic components above have important guiding significance for studying the biological origin of the earth. All aerospace powers have made progress in asteroid exploration, but they are now mostly focused on surround detection and ground contact detection. If landing observations on asteroid surfaces are achieved, deeper detection can be carried out by means of scientific detection instruments carried on landing detectors. . Based on the requirements of landing patrol detection, in order to solve the problem of poor adaptability of ordinary robot terrain, this paper proposes a new type of hopping robot. The design utilizes the principle of tumbler, so that the robot can maintain the standing posture regardless of the posture, and design the jumping mechanism inside, so that the robot can realize the jumping function, and at the same time change the direction of the robot by adjusting the internal centroid position. Aiming at the design, this paper established the spring and mass system dynamics model, carried out the system simulation analysis, and obtained the take-off height and speed under different conditions. In order to verify the feasibility of the bouncing robot scheme, the development of the prototype is realized, and the corresponding index conversion results of the take-off height in the microgravity environment are given. It is verified that the robot uses the gravity and the momentum wheel to take the initiative on the ground and during the jump. Controls the effect of posture adjustment. The related research in this paper can be used as a reference for the design of asteroid detection robots.