



DEVELOPMENT OF A CARDAN MECHANISM FOR THE ASTEROID LANDER

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Abstract- It is of great significance for improving the landing stability and adjusting the attitude of equipment base by designing a cardan mechanism in the asteroid lander. In the paper, a cardan mechanism having cushion and attitude adjusting functions is designed for the asteroid lander. The cardan mechanism contains electromagnetic damping, belt transmission and cross-shaft, and it has merits of adjustable damping and bearing large overload. The attitude control system of the cardan mechanism is built by FPGA chip. Kinematics and kinetics of the cardan mechanism are analyzed for attitude control. Complex feedback PD controller is applied to control the attitude of the cardan mechanism as large mass equipment base would influence control performance. This controller contains real time gravity compensation, desired acceleration compensation and velocity feed forward compensation. The experiments show that the cardan mechanism designed in this paper has good performance by adopting Complex feedback PD controller.

Index terms: Cardan mechanism, kinematics, kinetics, complex feedback PD controller, asteroid lander.