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OFF-ROAD DRIVING CONTROL UNDER THE LUNAR ENVIRONMENT

Abstract

In the lunar environment, it is necessary to drive under the environment with high slip frequency due to regolith. And there is issue that it gets stuck due to reduced traction because tires sink into the soil by slipping. The lunar environment has many off-road conditions, such as regolith, rocks, and craters, where changes of running resistance are large. Therefore, there is also the issue that acceleration control is difficult. In response to these issues, driving performance improvement effect by slip ratio control for each wheel and the effect of vehicle speed tracking by estimating running resistance were evaluated. In off-road, the slip conditions of each wheel are different, and it is necessary to control the slip ratio of each wheel independently. However, in the vacuum environment of the lunar surface, heat dissipation depends on radiant heat. Therefore, the application of hydraulic brakes for slip ratio control has significant restrictions such as limiting the frequency of use by generating a lot of heat during braking. For this reason, electrified vehicle was used so that each wheel could be controlled by motors. The evaluation was conducted on soil that are similar to regolith to verify driving performance. In conclusion, driving performance was improved by controlling optimal slip ratio. And vehicle speed tracking performance has been improved by estimating the running resistance that changes on each road surface and reflecting it in the driving force.