

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)

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THE GAIT SWITCH AND CONTROL ON RECONFIGURABLE EXPLORATION ROBOT

Abstract

A set of gaits on the reconfigurable exploration robot are developed to switch and control applying for very irregular and otherwise impassable terrain in planet. The digital prototype of a reconfigurable 12 tetrahedral elements robot has been built firstly. Then 3 kinds of gait modes are presented regarding to flat road, irregular surface, narrow and long steep incline respectively, in which the gaits are rolling, walking and pole-jumping. Based on the vision information of the distance sensor, the rule of gait switching and the strategy of gait controlling are planned. When switching the gaits directs at the variational terrain, the contact force between the feet of the robot and the planet surface is adequately considered to avoid unstable movement, for that the expansion links of the robot have to be suitable for closed loop control in the axial length. Additionally, the kinematic and dynamic simulation analysis of the 12 tetrahedral element robot in gait switching is also achieved and characteristic parameters are deduced, these works validate the exploration capability of the robot prototype in extreme environment and provide the effective reference to the system design.