Geophysical Research Abstracts,
Vol. 11, EGU2009-5976-3, 2009
EGU General Assembly 2009

High-Performance Micro-Rover for Planetary Surface Exploration

Y. Gao and X. Chen
University of Surrey, Surrey Space Centre, Guildford, (yang.gao@surrey.ac.uk)

Planetary robotic missions rely on rovers to produce surface mobility for multiple sites sampling and exploration. For example, the Mars Exploration Rovers (MER) have been extremely successful in the exploring a wide area of the Martian surface in the past four years. Each of the MER has the size of a golf car and weights Ĩ70 kg. They both result in a massive launch of nearly 1100 kg. Small rovers (5-30 kg) can help to provide moderate surface traverse and greatly reduce cost of the mission, e.g. the Sojourner rover of the Mars Pathfinder mission.

There is a growing interest in the micro-rover design and how to maximize performance of a miniaturized system. For example, the rover traversability and locomotion capability will be compromised if the objective is to reduce the size of the vehicle. Undoubtedly, this affects the rover performance in terms of mobility and usefulness to the mission. We propose to overcome this problem by investigating a new generation of rover chassis design to maximize its terrian capability.

This paper presents a chassis concept suited for a micro-rover system and negotiating with different planetary terrains such as the Moon and Mars. The proposed tracked-wheel is motivated by bringing together advantages of wheels and tracks, in the same time keeping the design simple and easy to implement. The chassis is built based on four tracked-wheels and offers 10 DOF for the vehicle. Analysis based on Bekker theories suggests this design can generate larger tractive effort (drawbar pull) compared to the wheeled design for the same rover dimensions. As a result, a more effective and efficent chassis can be achieved and leave a large design margin for the science payload.