

SPACE EXPLORATION SYMPOSIUM (A3)  
Moon Exploration – Part 3 (2C)

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DYNAMIC MODELLING OF A WHEELED LUNAR MICROROVER

**Abstract**

The dynamic model of a simple wheeled platform designed for lunar exploration is presented. The rover's architecture is based on 4 elastic wheels, connected to the body through independent, longitudinal swing arms suspensions. A preliminary design and analysis of this configuration aimed to investigating the feasibility of the concept and the overall performance of the rover was presented in a previous paper. The aim of the present paper is that of building a mathematical model able to simulate in detail the behavior of the rover and to be interfaced with a model of the control system so that different control strategies can be studied in detail. The model is kept as simple as possible, but the effect of the nonlinear behavior of the system and of the presence of the suspensions are anyway retained. The model allows to study the effects of the terrain characteristics, of the ground irregularities and the operating speed on the behavior of the rover. The paper describes also the construction of a physical engineering model. Initially the engineering model is used to validate the mathematical model by performing a number of typical maneuvers on both smooth and rough terrain, then it is used as a test bed for the implementation of the control system and as a trainer for the operators who will teleoperate the machine in the actual mission.