

SPACE EXPLORATION SYMPOSIUM (A3)  
Mars Exploration – missions current and future (3A)

Author: Mr. Yair Israel Piña López  
Universidad Nacional Autónoma de México, Mexico, yair.israel@ciencias.unam.mx

Dr. Epifanio Cruz-Zaragoza  
Universidad Nacional Autónoma de México, Mexico, ecruz@nucleares.unam.mx  
Mr. Edgar Giovanni Alonso Torres  
Universidad Nacional Autónoma de México, Mexico, warren@ciencias.unam.mx  
Prof. Lourdes Glafira Lopez Roldan  
Universidad Nacional Autónoma de México, Mexico, lourdes.lopez@enp.unam.mx

## THE USE OF MECHANICS PHYSICS FOR A SAFE LANDING ON MARS.

**Abstract**

The Mars Science Laboratory “Curiosity”, the rover that safely landed on Mars surface after seven minutes of terror passing through the Martian atmosphere. In order to land safely, Curiosity had to decelerate from speeds of several kilometers per second and reach zero speed exactly upon touching down on the surface. This was accomplished by a combination of atmospheric drag on the enclosed spacecraft during the initial hypersonic entry, deployment of a large parachute, and retrorockets. Here, we analyze by mechanical equations why all three of these factors were necessary to ensure a safe landing. In particular, we analyze the initial deceleration of a spacecraft at high altitudes, its impact speed with the parachute, the duration of its descent on a parachute, and the use of retrorockets using as example the Curiosity’s landing. Finally we conclude, the equations that we obtained shows the possibilities to continue these type of mechanism to get a safe landing on Mars.