High Fidelity Dynamic Simulation of MER and MSL Rovers

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Abstract

In 1997 and 2004, small wheeled robots ("rovers") landed on the surface of Mars to conduct scientific experiments focused on understanding the planet's climate history, surface geology, and potential for past or present life. Recently, the Mars Exploration Rover (MER) "Spirit" became deeply embedded in regolith at a site called Troy, ending its mission as a mobile science platform. The difficulty faced in navigating mobile robots over sloped, rocky, and deformable terrain has highlighted the importance of developing accurate simulation tools for use in a predictive mobility modeling capacity. These simulation tools require accurate knowledge of terrain model parameters. This presentation describes a terramechanics-based tool or simulation of rover mobility that is being collaboratively developed by researchers at MIT, Washington University, St. Louis, and JPL. It also describes ongoing work toward estimation of terrain parameters of Mars soil.