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## ANALYSIS, DESIGN AND VERIFICATION OF LANDING SYSTEM TOUCHDOWN DYNAMICS

**Abstract**

Future exploration missions pose demanding requirements towards access by vehicles to scientifically interesting sites on planetary surfaces. Driving requirements stem from the need of more flexibility in site selection, improved payload to vehicle mass ratios and higher mission success probabilities. The Joint Cooperative Project "Landing Technology" with members from the DLR Institute of Space Systems and EADS Astrium, Bremen, is focusing on the development, evaluation and verification of experimental and analytical methods for the investigation of the touchdown dynamics and landing system design. Core element for the experimental investigation is the DLR Landing Mobility Test Facility (LAMA), which allows dynamic touchdown testing on system and component level. As a bread board for the investigation of the landing platform a representative Lander Engineering Model (LEM) is designed, sponsored and equipped by the Astrium. The design of the LEM is driven by today's European missions to Moon and Mars with focus on the support of the European Lunar Lander. Alongside the hardware oriented test facility / test object set-up, a numerical simulation tool chain has been established for the landing dynamics prediction and analysis. Based on a preparatory test program and two drop test campaigns with the LEM the technological maturity of the key elements of a landing platform with landing legs is increased stepwise. This poster highlights the facilities, simulation and analysis tools as well as the underlying process developed and used by the working group.