**Parametric Optimization of Rigid Wheels for Planetary Surface Mobility Applications**

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Design-Build-Test approaches for spaceflight hardware are time and cost intensive, which can result in suboptimal mechanism designs. Optimization-based approaches that utilize high-fidelity models and physics simulation could overcome these limitations while simultaneously speeding up the mechanical design process and reducing cost. In this work, we present a toolchain that enables the multi-objective optimization of rigid rover wheels for planetary surface mobility applications. The toolchain uses Chrono's Continuous Representation Model (CRM) functionality to simulate granular soil and performs multi-objective parametric optimization on candidate rover wheels to meet a desired performance criterion. The resulting wheel design is then evaluated experimentally using a single-wheel testbed. We end with a discussion of how the toolchain can be extended to simultaneously co-optimize other system parameters, such as system power consumption and feedback control gains.