# Simulation Test Method for Mars Parachute Infinite-Mass Deployment Strength (Postprint)

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## Abstract

Due to environmental disparities, strength verification of Mars parachutes under Earth conditions presents significant challenges, necessitating the simulation of infinite-mass deployment processes under low dynamic pressure conditions. To effectively simulate the operational conditions of Mars parachute deployment, this study conducted relevant experimental technical research and proposed the airdrop test methodology as an effective means for strength verification of infinite-mass parachute deployment on Mars. The research analyzed the influence of test model mass on the infinite-mass deployment process, established the mass scale for test models, investigated deployment condition deviations through ballistic trajectory simulation analysis, and proposed precise control methods. Based on the airdrop test protocol developed in this study, eight successful Mars parachute strength verification tests were conducted. The obtained test data provided comprehensive and robust support for the strength assessment of China's Tianwen-1 Mars mission parachute. The successful implementation of these tests demonstrates that airdrop test technology can serve as a viable method for strength verification of infinite-mass parachute deployment on Mars.

## Full Text

## Preamble

The original text contains substantial encoding corruption that prevents reliable translation of most content. The following represents extractable structural elements only.

Mathematical expressions preserved as in source: MATH_{0016}

[Remaining content consists of irreparable encoding artifacts that cannot be meaningfully reconstructed.]