

# NASA SBIR/STTR Technologies



T7.01-9961 - Algorithms and Regolith Erosion Models for the Alert Code

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## Identification and Significance of Innovation

ORBITEC and Duke University have teamed on this STTR to develop the ALERT (Advanced Lunar Exhaust-Regolith Transport) Code which will include new developments in modeling of regolith erosion and entrainment on the Moon or Mars as well as plume transport with full mass and momentum conservation. The plume is handled in a Vlasov formalism with drag force on dust grains, dust equations of motion are solved over a size spectrum. The ALERT code will model landing scenarios as a spaceport design tool.



**ALERT Uses Dust-plume Momentum Conservation to Accurately Model Landings on the Moon or Mars**

**Expected TRL Range at end of contract (1-9): 4**

## Technical Objectives and Work Plan

- Task 1. Define requirements for the ALERT code, with NASA input
- Task 2. Prepare design of ALERT code: momentum-mass conserved
- Task 3. Design a simulated plume-regolith impingement experiment
- Task 4. Momentum and mass conservation tests with the ALERT
- Task 5. Analyze the data from the plume-regolith experiment
- Task 6. Perform numerical modeling of plume-regolith experiment
- Task 7. Implement models derived from experiment for ALERT code
- Task 8. Preliminary design of a Lunar-Mars ALERT tool for Phase II

## NASA Applications

A user friendly, accurate, ALERT code will be developed during the multiphase program to support Lunar activities. The technology would be used in NASA space applications including: Lunar manned and unmanned surface operations, logistics, Moon base planning and design, Mars surface and Mars-Moon operations, manned and unmanned, etc.

## Non-NASA Applications

This technology could be applied for other ORBITEC customers such as the Bigelow Aerospace's Space Hotel on the Moon, support for the Jamestown Group that may have many commercial Lunar missions. Plume entrainment of Lunar or Martian dust is a major hazard and planning consideration in the design of any commercial Moon base will benefit from the ALERT code as a planning tool.

## Contacts

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**NON-PROPRIETARY DATA**