

# Discrete Element Model Helps Prevent Wheel Slips

University of Alaska Fairbanks



Coupi's Polyphysica particle-based simulation model and discrete element method is a software product and method originally developed to support NASA missions to explore surfaces of the Moon, Mars, asteroids, and comets. It was created by researchers Anton Kulchitsky and Jerry Johnson at the University of Alaska Fairbanks (UAF). Coupi acquired the software copyright and technology rights from UAF through the Office of Intellectual Property and Commercialization (OIPC) after OIPC registered the copyright, helped to spin-out the startup from the university, and provided space on campus for the company offices.

Discrete Element Methods (DEM) simulations consider the individual existence of each discrete grain forming a solid or fluid, solving problems that are difficult to simulate. It models the behavior of solids, individual particles and aggregates using physical interaction rules including friction, elasticity, cohesion, cementation, viscosity, and force at a distance (e.g., gravity, electrostatics).

“ *The Coupi DEM model has simulated a Mars exploration rover's wheel mobility to help prevent wheel slips.* ”

Back on Earth, it has helped understanding of the impact forces of floating trees and debris on a diversion platform for turbines of hydrokinetic in-river power generators in Alaska. Past partners and clients have included NASA, JPL, DOE, and Honeybee Robotics.

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