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Applicability of Resistive Force Theory in design optimization for locomotion in granular beds SHASHANK AGARWAL, KEN KAMRIN, Massachusetts Institute of Technology MIT, ANDY KARSAI, DANIEL GOLDMAN, Georgia Institute of Technology — Recent developments in the field of Resistive Force hypotheses for granular media has inspired for the discovery of a general dimensionless form for granular locomotion, which instructs how to scale various dimensions and parameters for predicting associated dynamic outputs related to motion of various locomotors in given granular media beds. Scalings are experimentally confirmed with wheel pairs of various shapes with varied dimensions and driving conditions, by measuring the corresponding outputs in various non-cohesive granular media beds. A newly developed class of mutable wheels called the Franken wheel has also been experimented to optimize the performance of flapped wheels locomotors. The experimental results are matched with numerical computations developed using RFT hypothesis which has recently been also revealed to be a special case of local frictional yielding in Columbic plasticity.

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