

Contribution submission to the conference Dresden 2026

Impact of Roughness on Packing Fraction — •ADRIEN LUYCKX
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This study investigates the impact of particle rugosity on the mechanical properties of piles using computational methods. We focus on smooth, non-convex particles (rod, cross, and star shapes) approximated via multisphere approach. Our research introduces the concepts of macro-rugosity, which increases as we progress from rod to cross to star shapes, and meso-rugosity, which is adjusted by varying the number of spheres composing the particles. Key findings include: (1) A limited meso-rugosity is sufficient to capture the mechanical properties of a pile, such as its height. (2) As macro-rugosity increases, the required meso-rugosity decreases. These results demonstrate that particle representation can be optimized by balancing meso-rugosity with the imposed macro-rugosity, significantly reducing computational demands. Our findings contribute to the ongoing efforts in enhancing the efficiency and accuracy of discrete element methods (DEM) in modeling complex particle systems.

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