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Case Study/Master's Thesis

Topic

Implementation and validation of a cohesion model in DEM

Background

In the study of particle systems, understanding the cohesive interactions between particles is crucial for the prediction of the material behavior under various conditions. Discrete Element Method (DEM) simulations provide a powerful tool for modeling these interactions, especially in systems where particle cohesion plays a significant role, such as in powders and granular materials. This case study/thesis focuses on the implementation and validation of a modified cohesion model within our in-house DEM code, starting with the simulation of grease-coated wood particles inside a shear cell. The study will assess the model's accuracy in replicating experimental results and its application to a larger system. Research on these topics is funded by the European Commission within the framework of the "Horizon Europe" project.

Task

The first step of the study will involve a literature review of existing cohesion models that are currently implemented in DEM. This review will highlight the existing gaps in the current cohesion models being used. The case study will focus on developing a modified cohesion model in DEM that accounts for the behavior of grease-coated wood particles inside a shear cell. The model builds on Luding's approach, introducing a two-stage unloading process to simulate the effects of the grease layer more accurately. The validation phase will compare the simulation results with experimental data. Specifically, the model's predictions of normal and shear forces will be compared against experimental results to evaluate the accuracy of the model, particularly in short-duration scenarios where the agreement is expected to be closest.

Contact

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