- Phd proposal 2023 -

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Wear when moving in sand

After water, granular material is the second material used in industry. In many processes, objects move in contact with sand as grains are collected, transported, mixed, ... Contact between tools and granular material produces severe wear and erosion due to the highly abrasive nature of granular media. This problem has never been addressed from a physical perspective, trying to understand the fundamental laws controlling the wear on an object moving through sand. The change in shape of the object results from a coupling between abrasion law, and the distribution of stresses and velocities around the object, which are non trivial due to the peculiar rheology of granular media. The goal of the Phd is to design a model experiment to study how the shape of a simple object evolves when it moves for a long time through a granular material, and to try to develop models based on the knowldge of the flow of granular media around obstacle. The experimental approach will involve force measurements, image processing, 3D imaging and will be coupled with theoretical and numerical studies This work is part of a collaboration with Feurst, a company designing tools for the mining industry. The Phd is funded thanks to a CIFRE doctoral fellowship.