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CONSEQUENCES OF THIRD BODY VORTICITY ON FIRST BODIES

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Fretting occurs in many mechanical systems, such as blade/disk contact in airplanes. This can lead to wear or cracking in contacts, and to the ruin of the mechanical parts. In dry contacts, the relative motion between the two parts may produce a third body [1]. The third body is made of wear debris and external particles and can be conceptualized as a granular material with very specific properties. This flow of third body helps to accommodate velocities and to transmit loads.

The flow of third body particles within the interface is modelled using a software developed at LaMCoS, called MELODY. Particles are highly deformable, and three parameters that control the rheology of this flow (pasty, agglomerated, granular, etc.) were identified: stiffness, cohesion, and viscosity [2]. In some simulations, large agglomerates are visible. A mathematical tool has been developed to quantify the size and the lifetime of these agglomerates, and is called "coherence" [3].

The purpose of this study aims to simulate realistic interface and loading conditions. A deformable body submitted to a flow of particles that form more or less important agglomerates is considered. Strains and stresses patterns in the body are analysed in space and time, and a link is made with the flow regime of the third body.

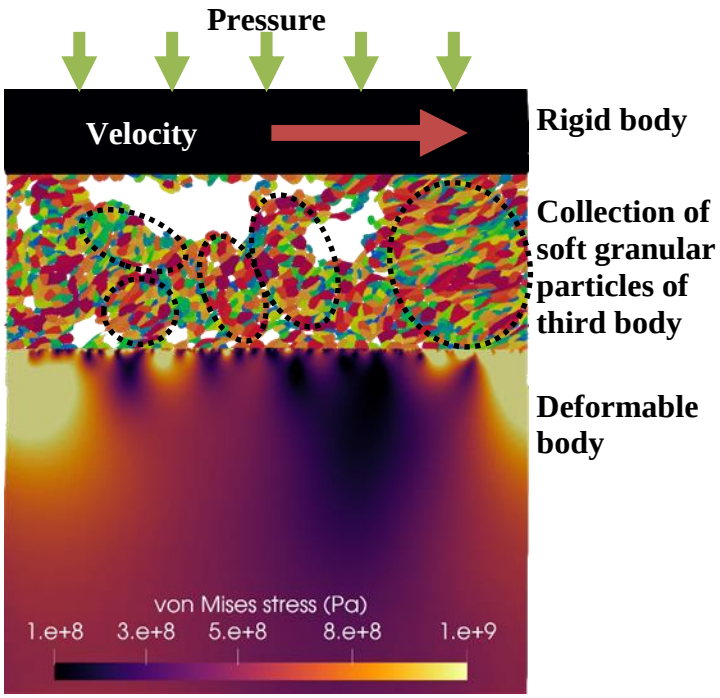

Fig. 1: Simulation with 1000 deformable grains submitted to compression and shear, with a deformable lower body. Colour in lower body indicates von Mises stress, colour for particles is arbitrary and only serve to distinguish grains. Some agglomerates are highlighted.

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