86st MSS-Seminar
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Nägelsbachstr. 49b

Numerical simulation and experimental investigation of mass flow subjected to increased gravitational force condition

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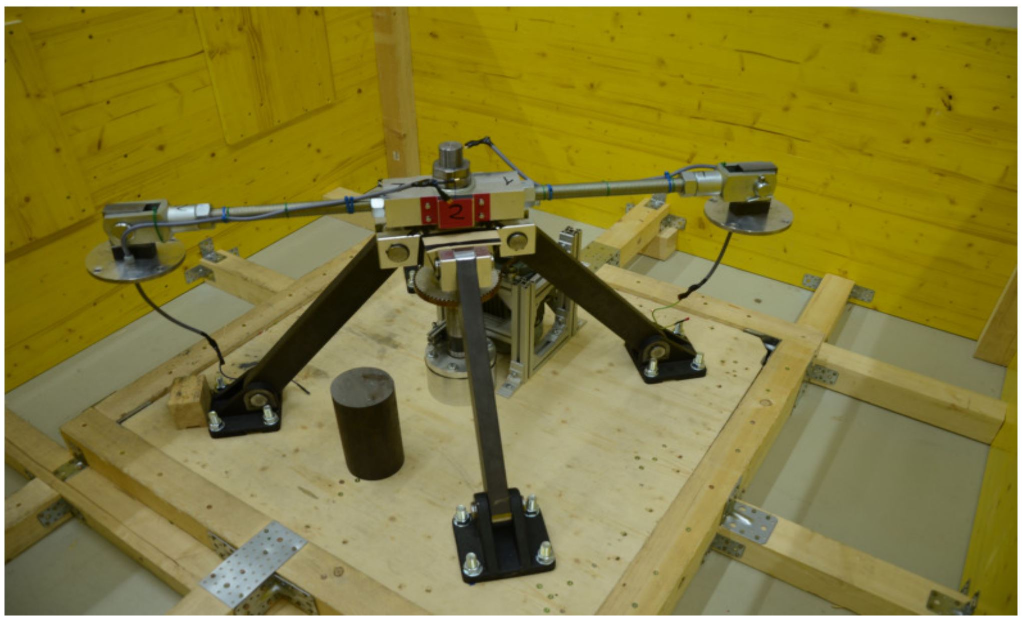

Figure 1 – Centrifuge assembled to measure mass flow under increased gravitational force conditions.

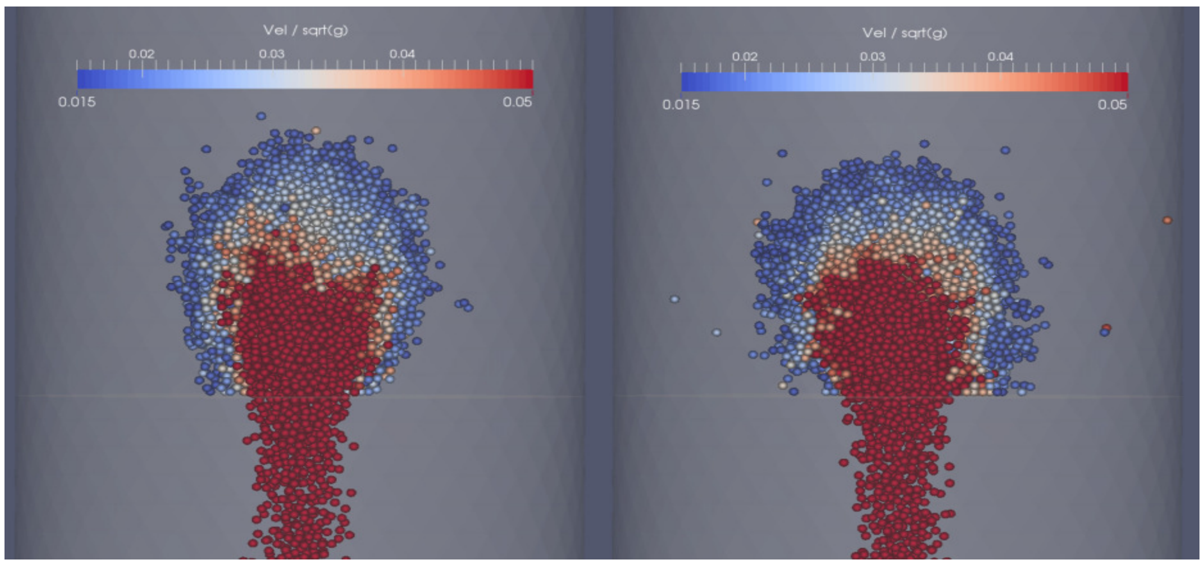

Figure 2 - Similarities in dilated region of systems subjected to 1.67 g (left) and 68.68 g (right). Velocity was divided by the square root of the g-force.

Granular flow through silos is an extensively studied problem. Gravitational mass flow through flat bottom silos can be analytically described by the well known Beverloo correlation. We propose to investigate mass flow under increased gravitational force conditions using cohesive and non cohesive powders. Experimental data is obtained by measuring the mass flow in flat bottom silos coupled to a centrifuge (Figure 1). Numerical simulations using Discrete Element Method (DEM) were run and data compared to measured experimental mass flow. We could depict a good agreement with Beverloo correlation for non cohesive coarse particles for g-forces of up to 70 g. Similarities in flow profile were also depicted in systems subjected to different g-forces (Figure 2). Furthermore, the effect of cohesion and drag in fine particles was addressed by comparing experimental data with Carleton correlation.