Supplementary materials for "New patterns in high-speed granular flows"

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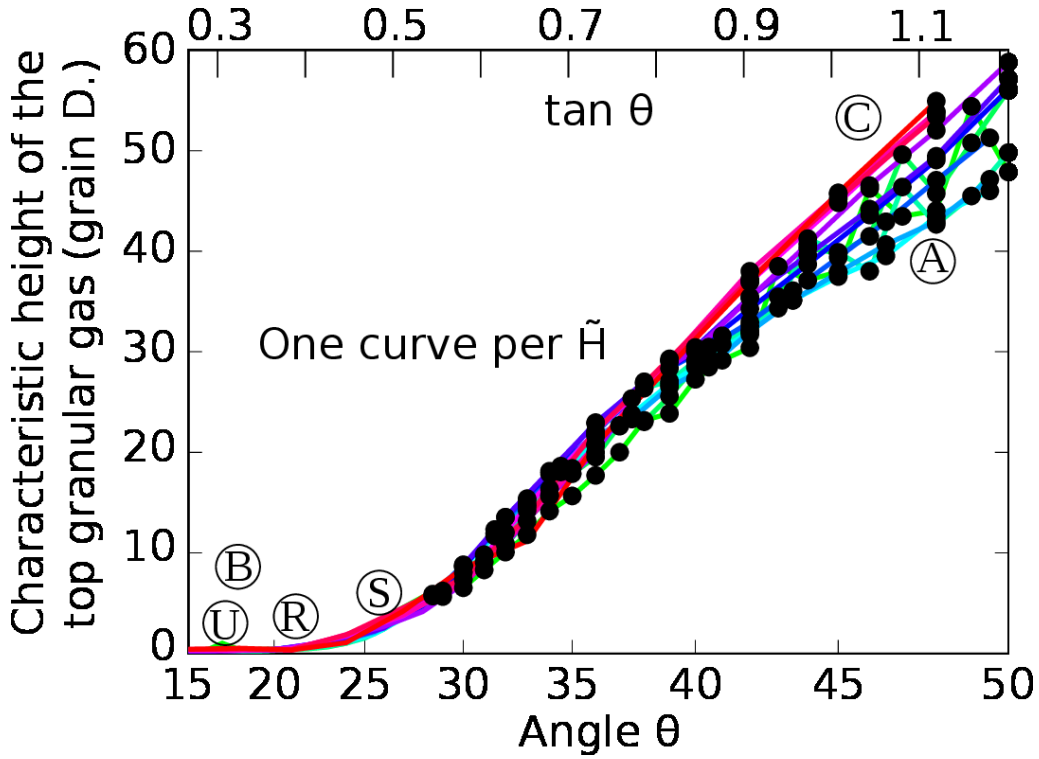

FIGURE 1. The volume fraction $\nu(z)$ in the dilute atmosphere above the core is well fitted by a decreasing exponential $\nu(z) \propto \exp(-z/H_c)$ where H_c, the characteristic height of the atmosphere, increases with the angle of inclination θ.

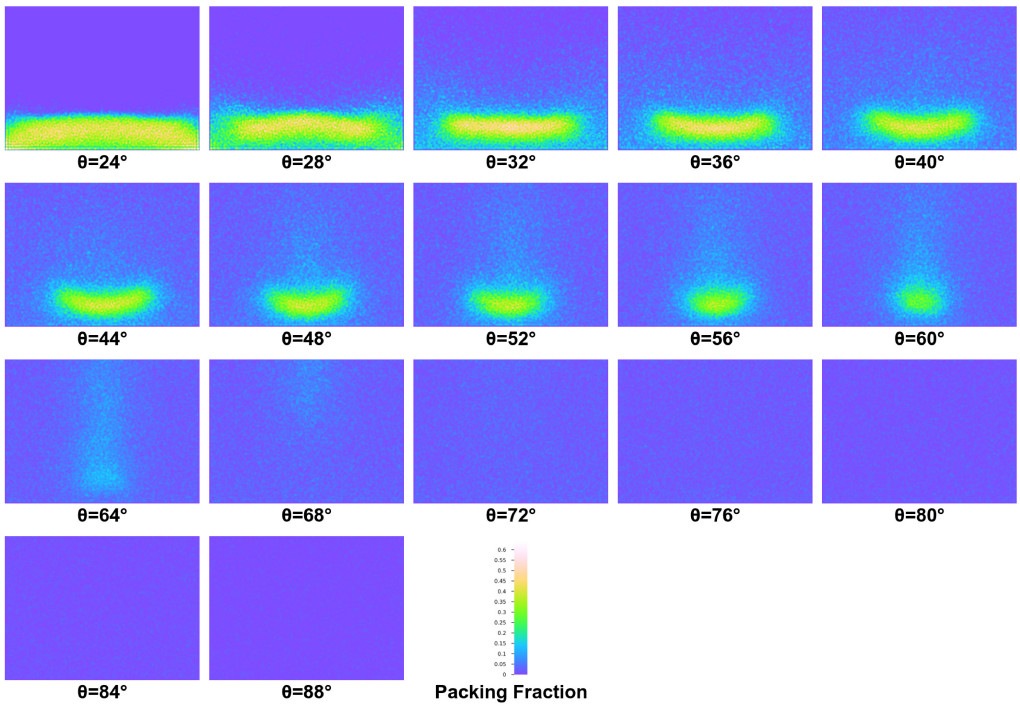

FIGURE 2. Transition of the supported core toward a purely granular gas regime when the angle of inclination increases

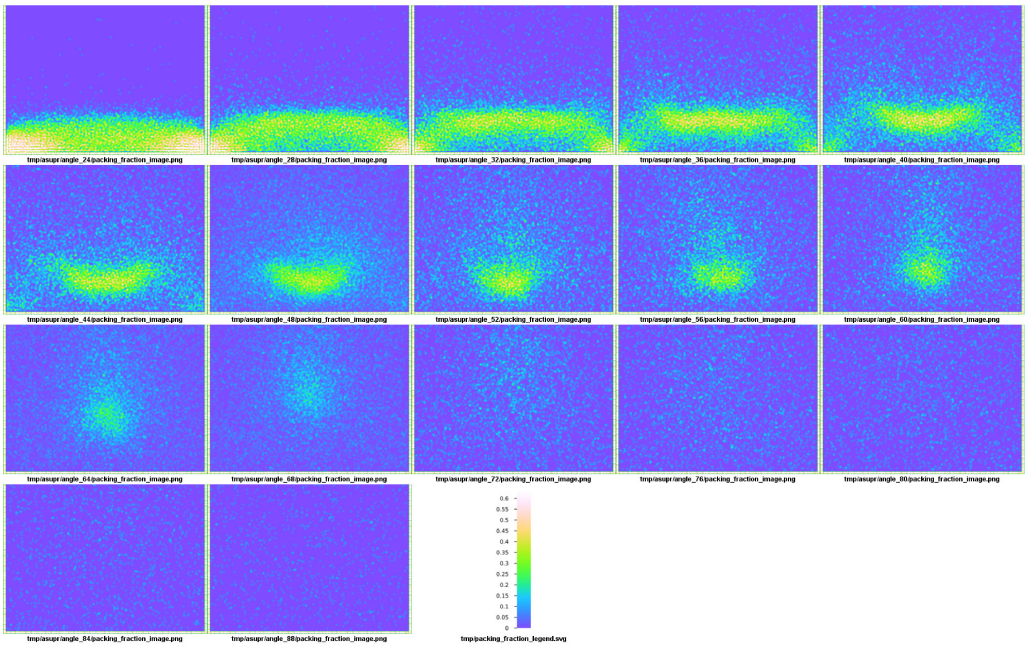

FIGURE 3. Transition of the supported core toward a purely granular gas regime when the angle of inclination increases, when the boundaries consist of fixed grains. The supported core regime is robust to the different nature of the boundaries. The transition to the supported core at low angles is different, but once the granular gas layer separates the core from the boundaries the regimes are qualitatively the same as in the flat surfaces case.

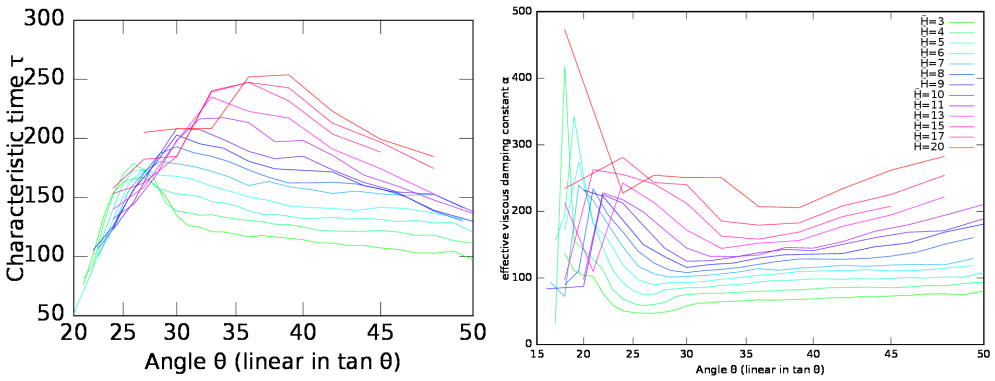

FIGURE 4. The typical temporal evolution of the average flow velocity to reach the steady regime is exponential (see Fig. 4a of the paper). The corresponding characteristic time τ and effective viscous damping constant $\alpha = M/\tau$ increases with the mass holdup.

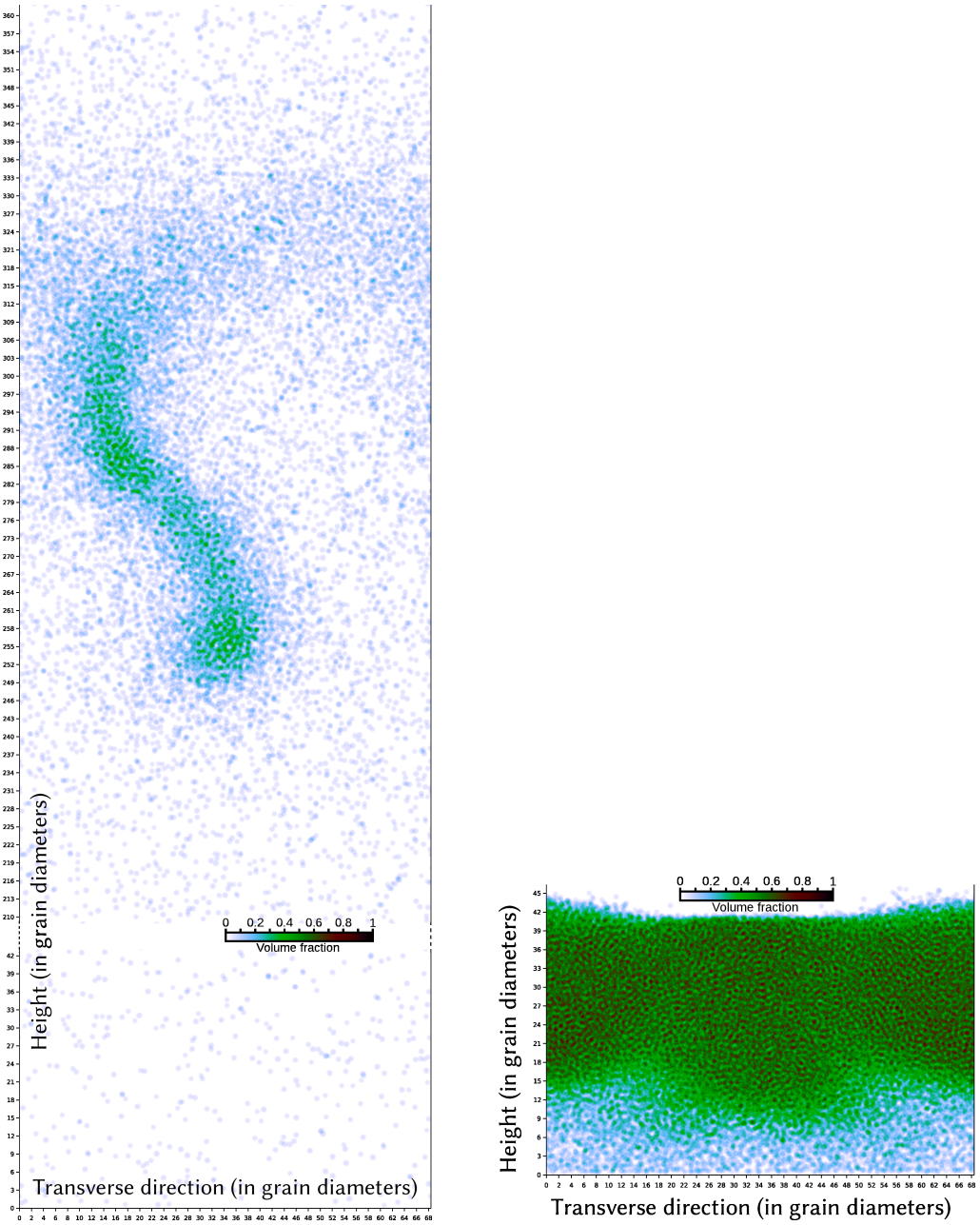

FIGURE 5. Left: Asymmetric supported regime which appears as a transient state when the basal friction is set to large and unrealisitic values ($\mu = 10$) and with lateral periodic boundary conditions. Right: Supported regime observed for a mass hold-up equal to 18, an angle of inclination set to 28°, a basal friction coefficient $\mu = 10$ and with lateral periodic boundary conditions.