Contribution ID: **11** Type: **not specified**

Kinetic theory of moderately dense dry granular particles under a simple shear: steady flows and anomalous relaxation dynamics

Friday, June 6, 2025 12:15 PM (45 minutes)

We formulate the kinetic theory of dry granular particles under a simple shear based on the Enskog and Grad approximations. We get a complete set of equations for the kinetic stress and the collisional contribution to the stress within this approximation. The steady solution under this approximation reproduces the quantitatively accurate results for the shear viscosity and kinetic temperature for the volume fraction $\varphi < 0.5$ except for the case of nearly elastic situations. We also get qualitatively accurate results for the steady normal stress differences for $\varphi < 0.5$. By using a protocol of reversing a shear rate satisfying Newton's equation of motion, we also discuss the relaxation dynamics to reach the steady state. We observe the Kovacs effect in a wide range of parameters and Mpemba effect if the initial conditions of two copied systems are not largely deviated. This is based on the collaboration with Shunsuke Iizuka and Satoshi Takada.

Presenter: HAYAKAWA, Hisao