

Rheology of granular materials near the jamming transition under oscillatory shear

*Michio Otsuki¹, Hisao Hayakawa²

1. Graduate School of Engineering Science, Osaka University, 2. Yukawa Institute for Theoretical Physics, Kyoto University

Amorphous materials consisting of repulsive and dissipative particles such as granular materials, colloidal suspensions, foams, and emulsions behave like liquids below a critical value of the packing fraction, while they behave like solids above that value. This sudden change is known as a jamming transition [1]. In this talk, we present our recent numerical results on the rheological properties of granular materials near the jamming transition under oscillatory shear. It is confirmed that the shear modulus depends on the amplitude of the initial oscillatory shear before the measurement [2]. Even at densities below the transition point, where isotropic jamming occurs without shear, the initial oscillatory shear can induce the finite shear modulus. This behavior is consistent with a transition known as shear jamming. We also discuss the yielding transition above the jamming point under sufficiently large strain.

[1] M. van Hecke, J. Phys.: Condens. Matter 22, 033101 (2009).

[2] M. Otsuki and H. Hayakawa, arXiv:1810.03846.

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