Abstract Submitted
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Strong reduction of the rigidity of repulsive contact systems at vanishingly low temperatures[1] HAJIME YOSHINO, SATOSHI OKAMURA, Department of Earth and Space Science, School of Science, Osaka University — Contrarily to ordinary solids, the amorphous solid states of repulsive contact systems such as colloids and emulsions may not be regarded simply as harmonic states [2]. We studied the rigidity, i. e. the shear-modulus of such a class of systems at vanishingly low but finite temperatures using the cloned liquid approach [3] and molecular dynamic simulations. Our result implies breakdown of the commutation of the thermodynamic limit $N \to \infty$ and zero temperature limit $T \to 0$ for the response to shear: we found the rigidity in the limit $T \to 0$ is significantly smaller and exhibit a different scaling compared with that at $T = 0$. Interestingly the rigidity in the limit $T \to 0$ exhibits the same scaling as the pressure, as observed experimentally in emulsions[4]. Detailed numerical examination suggests that the strong stress relaxation is due to contact opening events activated at vanishingly small temperatures.

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