# Stress evolution in cyclic shear of dense suspensions

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## ABSTRACT

Dense suspensions, omnipresent in nature and industry, show features which cannot be found in Newtonian fluids. A noticeable difference occurs during shear reversal experiments [1], showing history-dependent behaviour in the suspension stress evolution. Recent work [2] identifies stress contributions stemming from mechanical particle-particle contacts and lubrication force interactions and links their evolution to the suspension microstructure variation. In this work, we investigate numerically the stress evolution using cyclic shear in a homogeneous flow realised by applying Lees-Edwards boundary conditions [3] on a three dimensional periodic domain. Numerical simulations of inertialess, bi-disperse, dense suspensions are performed by employing the discrete element method (DEM) with a simple Hooke contact model, describing mechanical particle contacts, and an additional pairwise lubrication particle interaction, which is based on the grand-resistance matrix formulation [4], to account for interstitial Newtonian fluid. We extract detailed microscale data and compute different stress contributions with regard to the mechanical particle-particle contacts, particle velocity fluctuations and lubrication force interactions. We identify the stress evolution with respect to shear cycles and link to the microstructural evolution.

## REFERENCES

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