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Effect of aspect ratio on the stress response of frictional elastic rod assemblies VIKRANT YADAV, ARSHAD KUDROLLI, Clark University — We discuss the effect of aspect ratio on the response of a random assembly of frictional elastic rods under repeated top loading stress-strain cycles. Random assemblies of rods of different aspect ratios were created by rain deposition of particles. Considerable hysteresis is observed over the first few cycles, but the response starts to approach a more reversible path with each cycle. The assembly was scanned after each cycle using a 3D X-ray computer aided tomography instrument to determine position, orientation, and contacts of each constituent particle. We show that rods of small aspect ratio pack tend to have small compression under the same stress as compared to rods of higher aspect ratio because they pack more densely, and thus have larger Young's modulus. By tracking motion of constituent rods over subsequent cycles we observed that larger number of rearrangements take place in the bulk away from boundaries. The mean distance over which a particle moves to rearrange also decreases with each cycle. The mean numbers of contacts were also evaluated and were found to increase rapidly with small changes in volume fraction.

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