Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Failures of Angoricity as a Granular State Variable EPHRAIM BILILIGN, KAREN DANIELS, North Carolina State University — Stress-based ensembles incorporating temperature-like variables have been proposed as a route to an equation of state for granular materials. To test the efficacy of this approach, we perform experiments on a photoelastic granular system under three loading conditions: uniaxial compression, biaxial compression, and simple shear. This procedure gives us quantitative knowledge of the interparticle forces and contacts for an ensemble of configurations. Under all three histories, we find that the symmetric component of the force-moment tensor is exponentially-distributed, while the antisymmetric component is Boltzmann-distributed. Using this modified theory, we observe that the two components of the associated temperature-like variable, angoricity, are linearly related to confining pressure. However, the proportionality constant for this equation of state is both volume- and history-dependent. Therefore, we find the stress-based ensemble to be volume-dependent and angoricity to be a variable of process.

Ephraim Bililign
North Carolina State University

Date submitted: 11 Nov 2016 Electronic form version 1.4