Experimental Tests of Nonlocal Rheology in Dense Granular Flows ZHU TANG, North Carolina State University, TED BRZINSKI, Haverford College, MICHAEL SHEARER, KAREN DANIELS, North Carolina State University — Several nonlocal granular rheology models have been proposed to address shortcomings in local rheology models. One such model, developed by Kamrin & Koval, is based on extending a local Bagnold-type granular flow law by including a Laplacian term that accounts for the grain size and cooperative effects. We perform experiments to test this model in a quasi-2D annular shear geometry with a fixed outer wall and a rotating inner wall. We obtain the speed profile by particle tracking. We measure the inner wall torque, and calculate the pressure and shear stress on the outer wall using deformable laser-cut leaf springs. This allows us to calculate the relationship between the stress ratio μ and the inertial number I at different inner wall rotation speeds and packing fractions. The results are compared with nonlocal models.

Zhu Tang
North Carolina State University