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Evolution of Stress and effective Friction in 2D granular Couette Flow[1] MATTHIAS SPERL, Duke University, T.R. JONES, K.A. MCKENZIE, R.P. BEHRINGER — Within geologic fault zones the internal friction in a material is expected to produce a large amount of heat. However, far less heat than expected is generated, giving rise to what is known as the heat flow paradox in geophysics. One possible explanation is that a fraction of the stress is not released by sliding friction but rolling of particles, thus lowering the effective friction inside the fault zone. We study the effective friction in a 2D granular material by comparing the overall torque on the inner wheel of a Couette cell with the stress inside the material for various loads. The load is varied by changing the number density of the particles in the cell, and the stress is measured by using stress-birefringent particles. The relation between torque and mean shear stress can be interpreted as an effective friction coefficient. After cessation of shear both the internal stresses and the overall torque decay logarithmically over time confirming a slow decay of the stress network in a sheared granular material.

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