

Supporting Information for “Slide-hold-slide experiments and frictional healing in a simulated granular fault gouge”

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Table S1. DEM simulation parameters. If in some limited simulations, different parameter values are used, they are explicitly mentioned in the text.

Parameter	Value
Grain density, ρ	2500 [kg/m ³]
Young's modulus, E	50 [GPa]
Poisson ratio, ν	0.3
Grain-grain friction coefficient, μ_g	0.5
Confining pressure, σ_n	5
Coefficient of restitution, ϵ_n	0.98
Time step, Δt	2×10^{-8} [s]

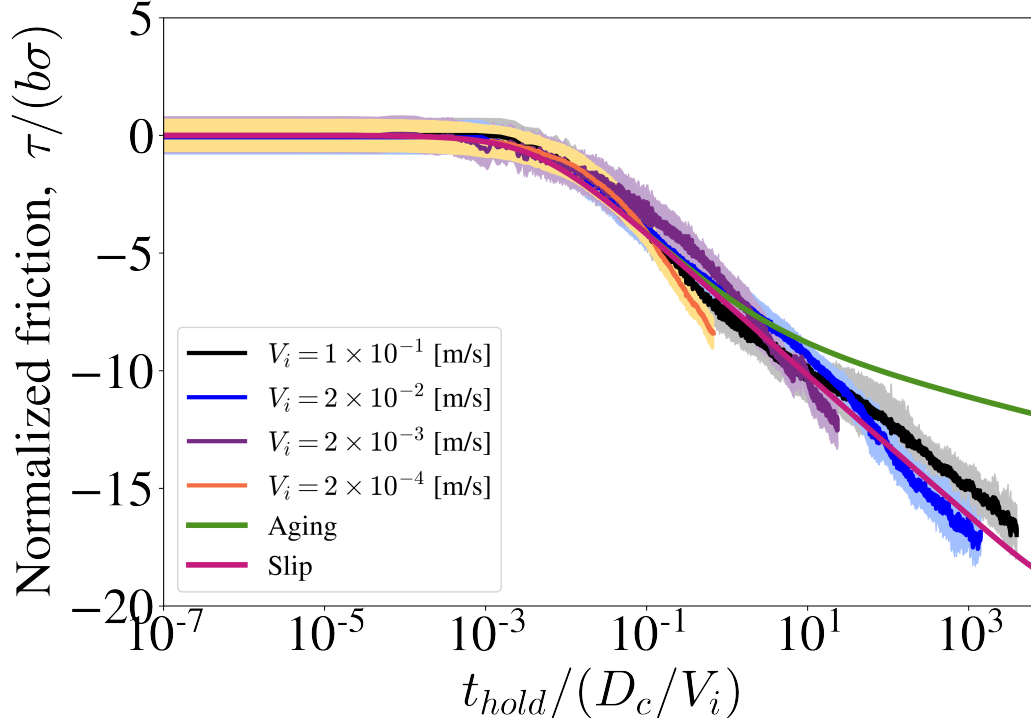


Figure S1. The variation of friction coefficient in slide-hold simulations with prior sliding velocities V_i of 2×10^{-4} , 2×10^{-3} , 2×10^{-2} , and 10^{-1} m/s. All simulations are run with system stiffness $\bar{k}_d \approx 425$ at the confining stress 5 MPa. The lines show the mean behavior of 8 realizations for each system, and the width of the shades regions around each line shows the 2-sigma deviations. The pink and green lines in panels (a) & (b) further show the predictions of the Slip and Aging laws, respectively, using the RSF parameters ($D_c = 0.0053$ m, $a = 0.0247$, $b = 0.0178$) determined independently from Slip-law fits to velocity-step tests performed on the same model (Ferdowsi and Rubin, 2020).

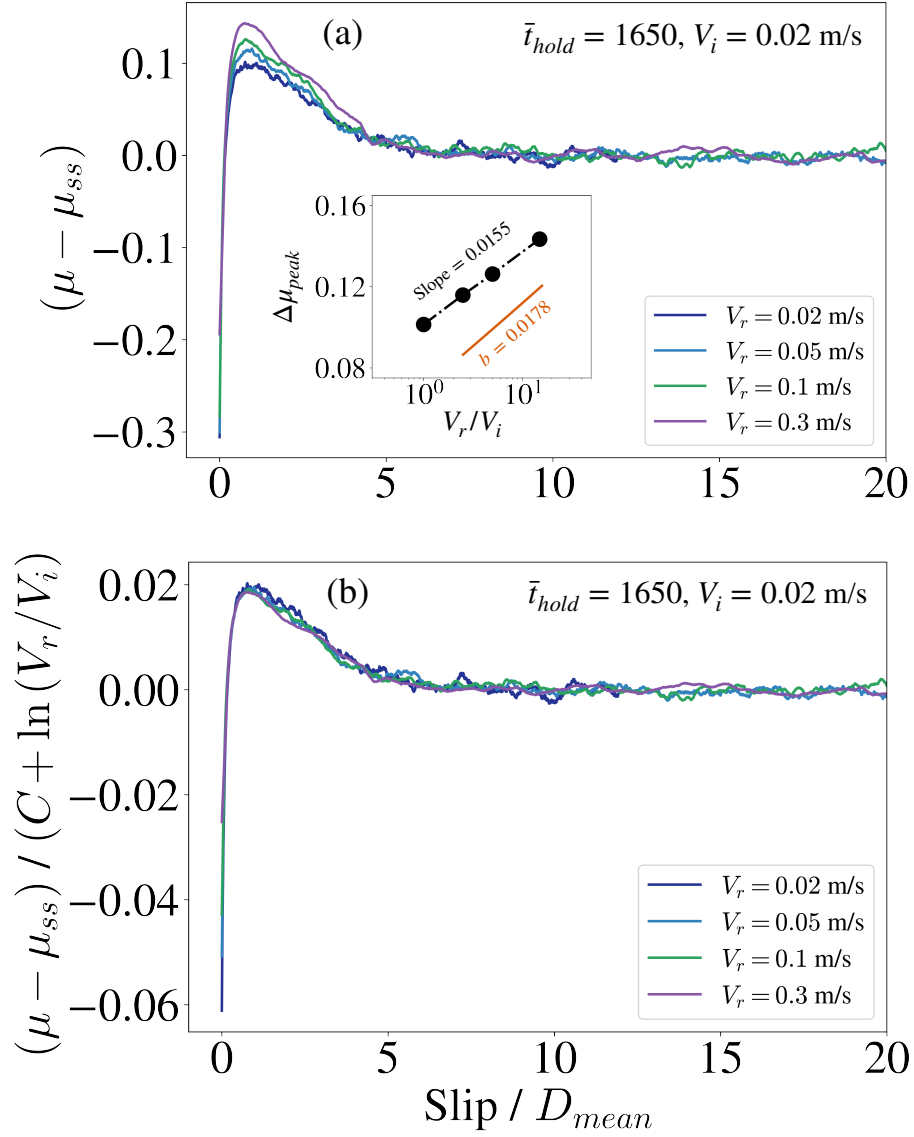


Figure S2. The variation of (a) friction $(\mu - \mu_{ss})$ versus slip distance (Slip / D_c), and (b) normalized friction $(\mu - \mu_{ss}) / (C + \ln(V_r/V_i))$ versus slip distance (Slip / D_c), during reslide portion of slide-hold-slide simulations for normalized hold time $\bar{t}_{hold} \approx 1650$, with the initial sliding velocity, $V_i = 0.02$ m/s, and different reslide velocities, $V_r = 0.05$ m/s, 0.1, and 0.3 m/s. The value of $C \sim 5$ is chosen empirically. The inset in panel (a) shows the variation of peak friction $(\mu - \mu_{ss})_{peak}$ versus the ratio of reslide to initial velocity, V_r/V_i . All simulations are run with system stiffness $\bar{k}_d \approx 425$ at the confining stress 5 MPa.