Supporting Information for Publication

Experimental study of Wet Cohesive Particles Discharging from a Rectangular Hopper

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S1. List of baseline parameters used in the computational work

Particle Properties	
Total number, n	6790
Mean diameter, d	0.224 or 0.235 cm
Density	2.5 or 7.85 g/cm^3
Interaction Parameters	
Spring stiffness	
particle-particle	
loading k_L	250,000 g/s^2
unloading k_U	283,000 g/s^2
tangential k_T/k_L	2/7
particle-acrylic wall	
loading $k_{L,w}$	250,000 g/s^2
unloading $k_{U,w}$	308,600 g/s^2
tangential $k_{T,w}/k_{L,w}$	2/7
Friction coefficient	
particle-particle	
sliding μ	0.20
rolling μ_R	0.01 cm
particle-acrylic wall	
sliding μ_W	0.20
rolling $\mu_{R,w}$	0.01 cm
Cohesion	
viscosity of liquid, η	0.001 g/cm/s
contact angle, liquid-particle, β	4 deg
contact angle, liquid-wall, β'	70 deg
liquid content, L	2 % (by volume)
surface tension, γ	72 dyn/cm
Bond number , Bo	1
Dimensionless hopper geometry	
Aspect ratio, $A = H/W$	0.74
Width, W/W_o	5.0
Outlet width, W_o/d	11.2
Depth, Z_{depth}/d	2.5
Half-angle from vertical, θ	90 deg

S2. Comparison of experimental discharge rate to that of simulations in the 55˚ hopper

System	Experimental Average Discharge Rate	95 % Confidence Interval	Simulation Results
Glass Beads Bo = 0	140.7 g/cm/s	14.4	138.2 g/cm/s
Cast iron Shots Bo=0	416.9 g/cm/s	75.3	454.5 g/cm/s
Cast iron Shots with Silicone Oil Bo = 0.3	393.7 g/cm/s	51.5	442.4 g/cm/s
Glass Beads with Silicone Oil Bo = 1	121.9 g/cm/s	6.2	125.8 g/cm/s
Cast iron Shots with Water Bo = 1	347.9 g/cm/s	72.3	408.6 g/cm/s
Glass Beads with Water Bo = 3.5	75.5 g/cm/s	21.2	52.6 g/cm/s