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The propagation and deposition process of a finite dry granular mass down a rough incline GENG LIN LEE, FU-LING YANG, Department of mechanical engineering, National Taiwan University, Taipei, Taiwan — This work presents a theoretical analysis on the propagation and arresting process of a $2D$ finite granular mass in shallow configuration down a rough incline. The coherence-length constitutive model proposed by Ertas and Halsey (2002) is used to solve the bulk motion and local coherence length scale, $l(x,t)$, that characterizes internal granular clusters. Flow depth profile, $h(x,t)$, governed by an advection-diffusion equation is solved by the matched asymptotic method under shallowness and used to determine a flow front trajectory, $x_f(t)$. The solutions reveal $l(x,t) < h(x,t)$ in the front indicating the clusters can move freely and transport momentum flux in a flowing bulk. The trend of $l(x,t)$ shows monotonic growing and becomes comparable to $h(x,t)$ upstream, indicating clusters transmit basal decelerating impulse to decelerate the flow, giving rise to rear deposit. The critical location where $l(x,t) = h(x,t)$ is solved to the leading order to determine a deposition front trajectory, $x_d(t)$. Under the constraint of conserved total mass, finite run-out distance, L_d, and arrested time, T_d, are estimated and used to construct a modified front propagation model, $x_{fm}(t)$, which compares well to the experimental data reported in Pouliquen and Forterre (2002)

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