

Video S1

Side view animation of the particle wall-normal positions taken from case $\phi = 0.44\%$ ($t = 2.2 H/u_\tau$). Particles are colored by their angular velocities.

Due to the settling effect, most particles accumulate near the bottom wall. Several typical transport modes of the sediment particles, such as resuspension, saltation, and rolling, are captured by tracking the trajectories of particles.

Video S2

Side view animation of two typical particle wall-normal trajectories taken from case $\phi = 0.44\%$ ($t = 3.2 H/u_\tau$). Particle A is colored by red and particle B is colored by blue.

Particle A spends all its time residing in the near-wall region while particle B is occasionally lifted up, resuspended, and traveled to the outer region of the channel.