Movie 01: Animation showing the formation of a steadily propagating self-channelized granular flow on a 32 degree slope for a mass flux of 130 g/s. The chute is coloured turquoise. The flow thickness is shown as a surface plot, which is coloured by the downslope component of depth-averaged velocity. The colour map is defined in figure 3. The dark blue regions corresponds to stationary levees. The grains flow down the central channel to the front, where they spread out laterally and are either over run or come to rest to form new sections of the levees. The black lines across the chute act like experimental laser lines, which deform as they are cut by the three-dimensional evolving surface.

Movie 02: Animation showing the temporal and spatial development of the three-dimensional particle-size distribution at the front of a steadily propagating self-channelized flow. Panels (a)-(h) show colormaps of the small particle concentration in various cross sections through the flow (as indicated in panels d and h), while panel (i) shows the depth-averaged small particle concentration looking down on the flow. The depth-averaged inflow concentration in the centre of the channel equals 0.8, and the large and small particles are assumed to have diameters 0.61 and 0.41 mm, respectively, implying that the particle-size ratio is 1.49. Beige shading indicates regions of 100 percent small particles and dark brown represents 100 percent large particles. The detailed colormaps are defined in figures 10 and 11.

Movie 03: Fly-by animation of the three-dimensional bulk-particle paths shown in figure 13(a). The trajectories start and end on the $\xi = 0$ plane, where the steady-state small-particle concentration is shown. The base of the flow is shaded grey to help visualize the shape of the steadily propagating flow front. The trajectories are colour coded to identify individual particle paths, and determine their start and end positions in the mapping shown in figure 14(a).

Movie 04: Fly-by animation of the three-dimensional large-particle paths shown in figure 13(b). The trajectories start and end on the $\xi = 0$ plane, where the steady-state small-particle concentration is shown. The base of the flow is shaded grey to help visualize the shape of the steadily propagating flow front. The trajectories are colour coded to identify individual particle paths, and determine their start and end positions in the mapping shown in figure 14(b).

Movie 05: Fly-by animation of the three-dimensional small-particle paths shown in figure 13(c). The trajectories start and end on the $\xi = 0$ plane, where the steady-state small-particle concentration is shown. The base of the flow is shaded grey to help visualize the shape of the steadily propagating flow front. The trajectories are colour coded to identify individual particle paths, and determine their start and end positions in the mapping shown in figure 14(c).

Movie 06: Animation showing the temporal and spatial development of the three-dimensional particle-size distribution at the front of a steadily propagating self-channelized flow. Panels (a)-(h) show colormaps of the small particle concentration in various cross sections through the flow (as indicated in panels d and h), while panel (i) shows the depth-averaged small particle concentration looking down on the flow. The depth-averaged inflow concentration in the centre of the channel equals 0.8, and the large and small particles are assumed to have diameters 0.65 and 0.4 mm, respectively, implying that the particle-size ratio is 1.63. The detailed colormaps are defined in figures 10 and 15.

Movie 07: Animation showing the temporal and spatial development of the three-dimensional particle-size distribution at the front of a steadily propagating self-channelized flow. Panels (a)-(h) show colormaps of the small particle concentration in various cross sections through the flow (as indicated in panels d and h), while panel (i) shows the depth-averaged small particle concentration looking down on the flow. The depth-averaged inflow concentration in the centre of the channel equals 0.8, and the large and small particles are assumed to have diameters 0.57 and 0.42 mm, respectively, implying that the particle-size ratio is 1.36. The detailed colormaps are defined in figures 10 and 15.

Movie 08: Animation showing the temporal and spatial development of the three-dimensional particle-size distribution at the front of a steadily propagating self-channelized flow. Panels (a)-(h) show colormaps of the small particle concentration in various cross sections through the flow (as indicated in panels d and h), while panel (i) shows the depth-averaged small particle concentration looking down on the flow. The depth-averaged inflow concentration in the centre of the channel equals 0.8, and the large and small particles are assumed to have diameters 0.53 and 0.43 mm, respectively, implying that the particle-size ratio is 1.23. The detailed colormaps are defined in figures 10 and 15.

Movie 09: Animation showing the temporal and spatial development of the three-dimensional particle-size distribution at the front of a steadily propagating self-channelized flow. Panels (a)-(h) show colormaps of the small particle concentration in various cross sections through the flow (as indicated in panels d and h), while panel (i) shows the depth-averaged small particle concentration looking down on the flow. The depth-averaged inflow concentration in the centre of the channel equals 0.9, and the large and small particles are assumed to have diameters 0.61 and 0.41 mm, respectively, implying that the particle-size ratio is 1.49. The detailed colormaps are defined in figures 10 and 16.

Movie 10: Animation showing the temporal and spatial development of the three-dimensional particle-size distribution at the front of a steadily propagating self-channelized flow. Panels (a)-(h) show colormaps of the small particle concentration in various cross sections through the flow (as indicated in panels d and h), while panel (i) shows the depth-averaged small particle concentration looking down on the flow. The depth-averaged inflow concentration in the centre of the channel equals 0.7, and the large and small particles are assumed to have diameters 0.61 and 0.41 mm, respectively, implying that the particle-size ratio is 1.49. The detailed colormaps are defined in figures 10 and 16.

Movie 11: Animation showing the temporal and spatial development of the three-dimensional particle-size distribution at the front of a steadily propagating self-channelized flow. Panels (a)-(h) show colormaps of the small particle concentration in various cross sections through the flow (as indicated in panels d and h), while panel (i) shows the depth-averaged small particle concentration looking down on the flow. The depth-averaged inflow concentration in the centre of the channel equals 0.6, and the large and small particles are assumed to have diameters 0.61 and 0.41 mm, respectively, implying that the particle-size ratio is 1.49. The detailed colormaps are defined in figures 10 and 16.