



Morphodynamics of a granular bed in a water-filled oscillating cylinder

M.D. van Gorp, M. Duran-Matute,
G.J.F. van Heijst

Fluid Dynamics Laboratory,
Eindhoven University of Technology

Ripples are produced in an oscillating cylinder containing water and a granular bed. The cylinder is forced by a sinusoidal signal that is perturbed by its next harmonic. The number of ripples in the final configuration depends on the amplitude and frequency of the main oscillation, while the perturbation causes the ripples to propagate azimuthally.

The granules are translucent PMMA particles that partially transmit the light from a uniform diffuse source below the bed. The bed thickness can be reconstructed from the intensity captured by a monochrome camera. The images are a sequence of snapshots of the sediment bed.

At the beginning of the experiment, the sediment bed is uniform and flat. First spiralling ripples emerge. The region near the center remains flat as the flow is not strong enough to move the particles there. Then, five radial ripples, that propagate in clockwise direction, emerge. After a while two of the ripples merge, resulting in a stable configuration with four ripples.

The measurement technique not only presents the bed evolution of a complex non-linear process in great detail, but also unveils beautiful patterns.

TU/e Technische Universiteit
Eindhoven
University of Technology

NWO
Netherlands Organisation for Scientific Research