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Sediment morpho-dynamics induced by a swirl-flow: an experimental study¹ ALFREDO GONZALEZ-VERA, MATIAS DURAN-MATUTE, GERTJAN VAN HEIJST, Eindhoven Univ of Tech — This research focuses on a detailed experimental study of the effect of a swirl-flow over a sediment bed in a cylindrical domain. Experiments were performed in a water-filled cylindrical rotating tank with a bottom layer of translucent polystyrene particles acting as a sediment bed. The experiments started by slowly spinning the tank up until the fluid had reached a solid-body rotation at a selected rotation speed (Ω_i). Once this state was reached, a swirl-flow was generated by spinning-down the system to a lower rotation rate (Ω_f). Under the flow's influence, particles from the bed were displaced, which changed the bed morphology, and under certain conditions, pattern formation was observed. Changes in the bed height distribution were measured by utilizing a Light Attenuation Technique (LAT). For this purpose, the particle layer was illuminated from below. Images of the transmitted light distribution provided quantitative information about the local thickness of the sediment bed. The experiments revealed a few characteristic regimes corresponding to sediment displacement, pattern formation and the occurrence of particle pick-up. Such regimes depend on both the Reynolds (Re) and Rossby (Ro) numbers.

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