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Swirling jet nozzle design for seabed excavation[1] J. ORTEGA-CASANOVA, N. CAMPOS, R. FERNANDEZ-FERIA, University of Malaga (Spain) — We have investigated experimentally the seabed excavation performance of several swirling jets, generated by swirl vanes with adjustable angles and different geometries inside a nozzle, impinging against a sand bed for several Reynolds numbers and different impinging distances. The velocity profiles of the swirling jets at the nozzle exit have been measured using LDA, for the different nozzle configurations and Reynolds numbers, and the main features of the generated footprints on the sand bed have been measured by image processing of photographs of the bed illuminated by a laser sheet. Numerical simulations of the flow and visualizations techniques have been used to understand the excavation characteristics of the different swirling jets. It is found that the maximum excavation power is produced, at moderate impinging distances, by jets with a maximum swirl intensity in an annular region surrounding a central core with almost vanishing swirl, and a marked maximum of the axial velocity at the axis. This particular velocity profile of the swirling jet is generated by one of the nozzle configurations considered when the Reynolds number is above a threshold value.

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