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Physical experiments and analysis on the generation and evolution of tsunami-induced turbulent coherent structures[1] NIKOS KALLIGERIS, PATRICK LYNETT, University of Southern California — Numerous historical accounts describe the formation of "whirpools" inside ports and harbors during tsunami events, causing port operation disruptions. Videos from the Japan 2011 tsunami revealed complex nearshore flow patters, resulting from the interaction of tsunami-induced currents with the man-made coastline, and the generation of large eddies (or turbulent coherent structures) in numerous ports and harbors near the earthquake epicenter. The aim of this work is to study the generation and evolution of tsunami-induced turbulent coherent structures (TCS) in a well-controlled environment using realistic scaling. A physical configuration is created in the image of a port entrance at a scale of 1:27 and a small-amplitude, long period wave creates a transient flow through the asymmetric harbor channel. A separated region forms, which coupled with the transient flow, leads to the formation of a stable monopolar TCS. The surface flow is examined through mono- and stereo-PTV techniques to extract surface velocity vectors. Surface velocity maps and vortex flow profiles are used to study the experimental TCS generation and evolution, and characterize the TCS structure. Analytical tools are used to describe the TCS growth rate and kinetic energy decay.

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