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Laboratory investigation of the erosion of cohesive sediments under oscillatory flows using a synchronized imaging technique IN MEI SOU, JOSEPH CALANTONI, ALLEN REED, YOKO FURUKAWA, Naval Research Laboratory — A synchronized dual stereo particle image velocimetry (PIV) measurement technique is used to examine the erosion process of a cohesive sediment core in the Small Oscillatory Flow Tunnel (S-OFT) in the Sediment Dynamics Laboratory at the Naval Research Laboratory, Stennis Space Center, MS. The dual stereo PIV windows were positioned on either side of a sediment core inserted along the centerline of the S-OFT allowing for a total measurement window of about 20 cm long by 10 cm high with sub-millimeter spacing on resolved velocity vectors. The period of oscillation ranged from 2.86 to 6.12 seconds with constant semi-excursion amplitude in the test section of 9 cm. During the erosion process, Kelvin–Helmholtz instabilities were observed as the flow accelerated in each direction and eventually were broken down when the flow reversed. The relative concentration of suspended sediments under different flow conditions was estimated using the intensity of light scattered from the sediment particles in suspension. By subtracting the initial light scattered from the core, the residual light intensity was assumed to be scattered from suspended sediments eroded from the core. Results from two different sediment core samples of mud and sand mixtures will be presented.

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