



US Army Corps
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Engineer Research and
Development Center

Precision Flow Table for Investigative Studies

Description

The precision table maintains a constant flow discharge across a horizontal portion of the table. Small-scale models depicting either idealized flow boundaries or portions of actual projects are placed on the glass horizontal test section of the flow table. Flow patterns created by the scale model solid boundaries, such as regions of flow separation, are quantified using a laser Doppler velocimeter (LDV) located beneath the horizontal section of the table. Complex flow patterns can also be visualized using traditional techniques of dye injection, surface tracers, and bottom tracers.



Visualization of dye injection in 3-dimensional model of Cook Inlet, Alaska

Issue

The precision flow table provides an efficient and cost-effective tool for examining complex flow patterns formed by solid boundaries such as jetties, bulkheads, groins, and rocky headlands. Flow modifications stemming from changes in boundary or upstream configurations are easily evaluated, and this aids project study optimization by quick identification of unsuitable alternatives. Flow table studies are predominately for screening ideas and alternatives, and the studies do not provide final design and project optimization, which should be accomplishing using more sophisticated tools such as large physical models or numerical simulations. The flow table simulates only current flow situations; waves are not included. Types of studies that can be conducted with this facility include: (1) Visualizing flow patterns in large estuaries, inlets, or where flow separation and three-dimensional flow occurs; (2) Obtaining velocity measurements near structures and in turbulent regions associated with flow separation at solid boundaries; (3) Quantifying flow conditions in idealized cases for use in validating numerical modeling techniques; (4) Quickly examining project impacts due to structure modification, addition, removal, or relocation; and (5) Observing the extent of flow three-dimensionality in order to determine the correct numerical modeling approach.

Benefits

The advantages of flow table studies include: flow conditions can be controlled precisely; the small size (4 ft wide by 8 ft long) of the table allows rapid (and inexpensive) changing of solid boundaries; complex bathymetry can be recreated at scale for minimal costs; and study costs are low. Disadvantages are as follows: currents are steady in time; waves can not be simulated; models of actual projects must be geometrically distorted which introduces some scale effects; and in most cases studies will not produce final design recommendations.

Users

District Engineers, Planners, and Engineering Consultants interested in rapid and low cost preliminary examination of complex steady flow problems.

Point of Contact

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