



# FLUIDS LABORATORY

## College of Engineering

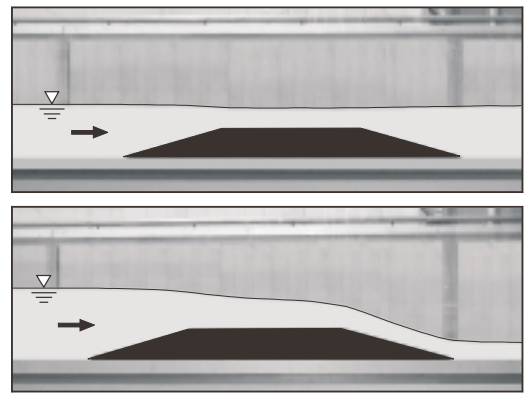
### Analysis of Open-Channel Flow Transitions Using the Specific Energy Diagram

#### Purpose

To observe water free surface behavior in an open-channel transition in conjunction with the specific energy diagram.

#### Test Design

The experiments are conducted in a rectangular open channel fitted with a bump that produces a gradual change of the bed elevation. Two subcritical flows are established upstream of the channel obstruction in order to observe the difference in the water surface elevation when the flow attains the critical depth above the bump. The free-surface water elevation and the governing parameters are measured and used in conjunction with the specific energy diagram.



#### Measurement Systems

Water surface elevation is measured with a 0.001 ft precision point gage positioned on an instrumentation carriage above the flume. Two separate water supply systems are used to obtain the high and, respectively, the low discharge flows. Orifice meters in conjunction with differential pressure manometer (precision 0.001 ft) are used to determine flow discharge.

#### Data Analysis

- Plot the water surface elevation in the vicinity of the channel transition.
- Construct the specific energy diagram using the measured data.
- Compare theoretical specific energy diagrams with the experimental curves.
- Comment on the flow behavior in the two flow situation.

#### Results

Water surface elevations and specific energy diagrams for the two flow situations are plotted below. The water elevation plot for Flow situation II ( $q_2 > q_1$ ) illustrates the role of flow control played by the bump for the upstream subcritical flow.

