

QUARTERLY PROGRESS REPORT

October, 1 2009 to December, 31 2009

No additional funding was received for the project in this reporting period. The total funding received for the TPF-5(164) study so far is \$195,000.

In this reporting period we again continued working on capturing boundary layer velocities using the THFRC Hydraulics Laboratories 3-dimensional (stereo) Particle Image Velocimetry (PIV) system we also include longitudinal velocity profile measurements in the helical corrugated culvert pipe currently installed in the culvert flume (pipe diameter 18" with 2.66"x0.5" corrugations, pipe length 16ft). The stereo PIV flow field recordings were performed at 2 sections (section 1 40" downstream from inlet and section 2 125.5" downstream from inlet) in the culvert (Figure 1). The sections had to be divided into 3 areas to capture the entire flow field. Figure 2 and 3 show PIV calibration grids for the 3 recording areas for each section. Figure 4 and 5 show the velocity flow field data for the left, center and right flow area in each section.

All velocity recording data are transmitted to the Transportation Research Analysis and Computing Center (TRACC) at the Argonne National Laboratory. The current status of the high performance Computational Fluid Dynamics (CFD) modeling for the fish passage study is presented in a the TRACC-CFD quarterly progress report.

The design for the tilting mechanism needed to study friction factors for low flows was finalized (Figure 6) and the construction/modification of the fish passage culvert flume is currently underway.

In the period from 10-01-09 to 12-31-09 no TPF funds were spent.

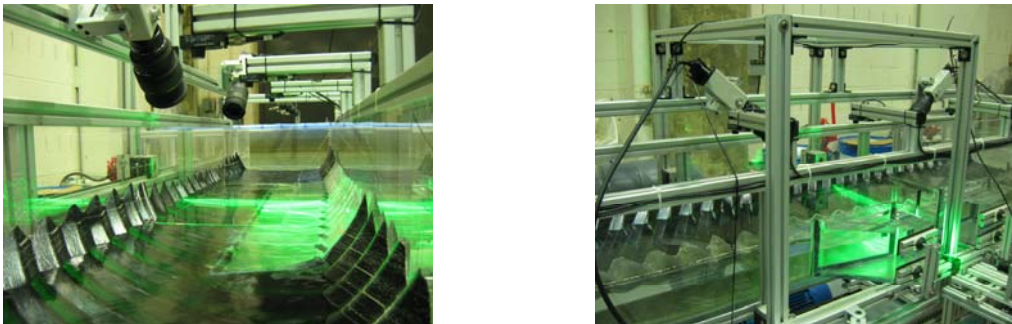


Figure 1: Stereo PIV set-up in the Fish Passage Culvert Flume

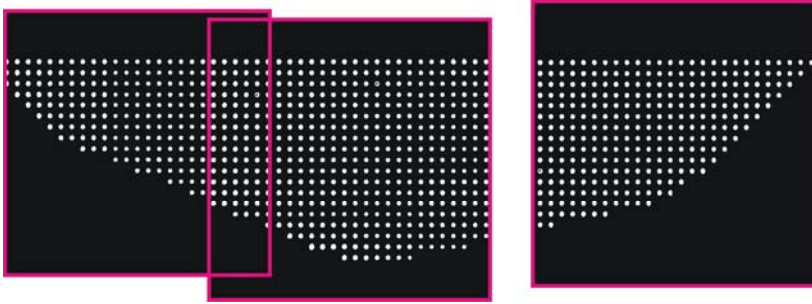


Figure 2: Calibration grids for section 1

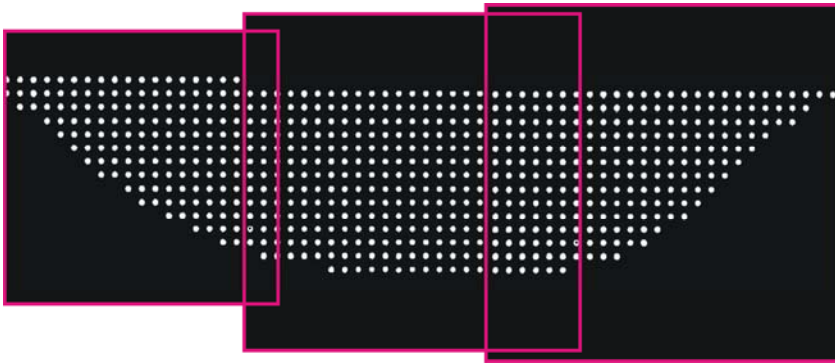


Figure 3: Calibration grids for section 2

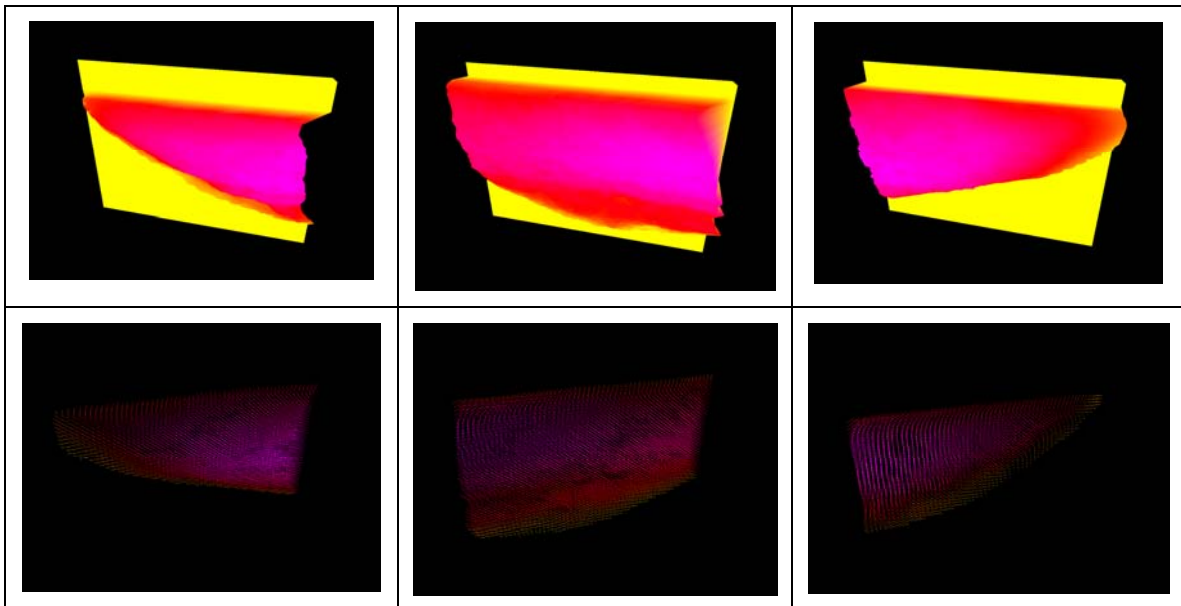


Figure 4: Velocity flow for the left, center and right flow area in section 1.

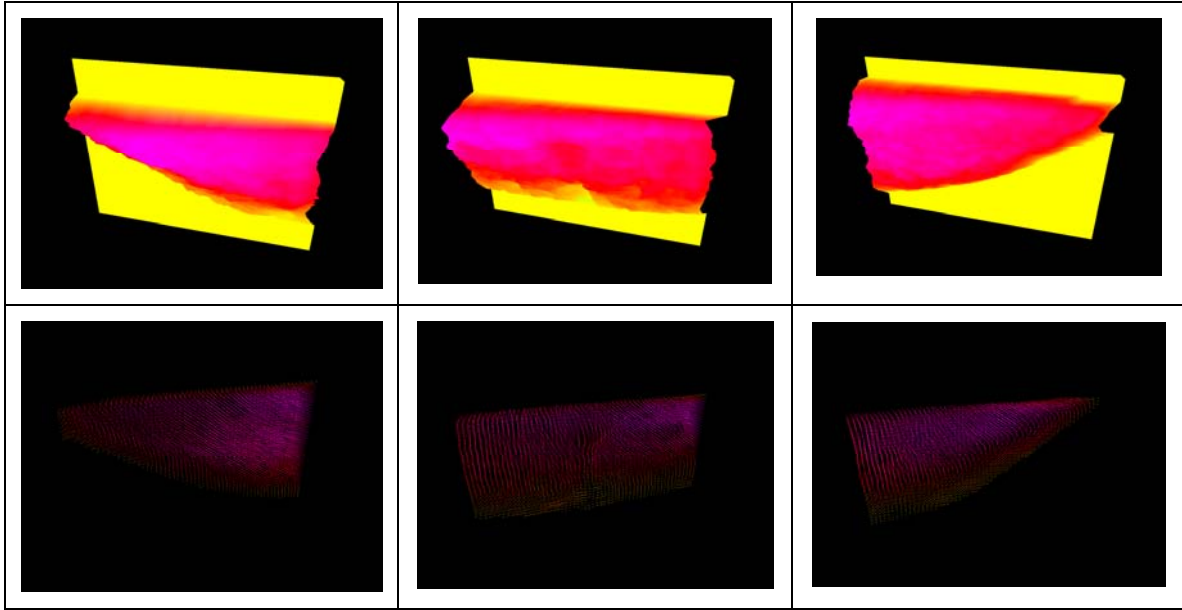


Figure 5: Velocity flow for the left, center and right flow area in section 2.

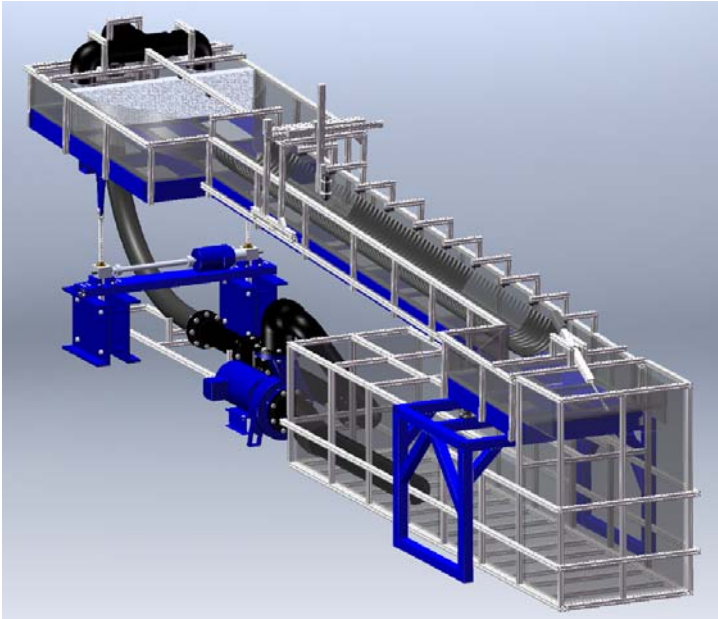


Figure 6: Final design of the fish passage culvert tilting flume