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PROFESSIONAL ENGINEERS

5th International Conference on Natural Channel Systems

Case Study: 2-D Hydraulic Modelling of Proposed Fish Ramp to Design for Fish Passage Potential

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Outline

1. Introduction
2. Methods of Design
3. Application of Methods
4. Model Results
5. Conclusions
6. Next Steps

Introduction

Problem Statement:

Simulate fish ramp design that promotes fish passage that could aid in overcoming limitations imposed by urbanization.

Methods of Design

- Theoretical Approach
- Physical Models
- Hydraulic Models

Theoretical Approach

- Design manuals (e.g. Introduction to Fishway Design, Katopodis, 1992)
- Publications (e.g. Passive propulsion in vortex wakes, Beal et al., 2006)

Physical Model

- Scaled model of design concept
- Simulate physical properties
- Test principals in flume

Hydraulic Model

- Virtual model
- Simulate physical characteristics
- Steady vs unsteady flow series
- 1D vs 2D/3D

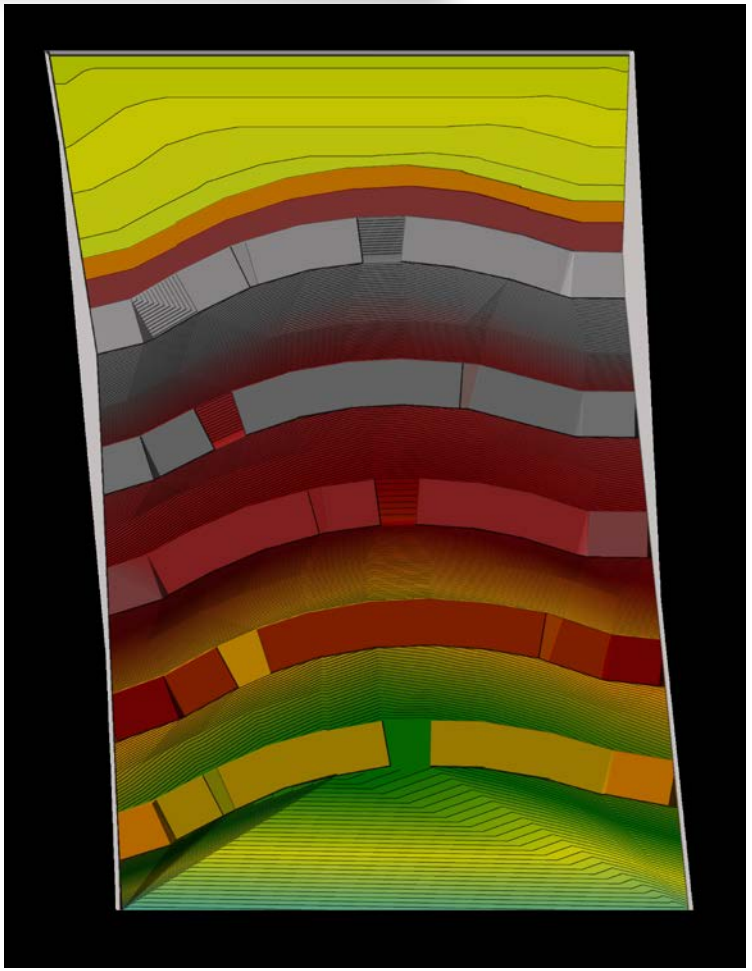
Application to Problem Statement

- Design concept based on publication by Beal et al, 2006
- Physical model could be built to simulate design concept
- Virtual model to further validate design principals

Fish Ramp Design Concept

Ramp Design:

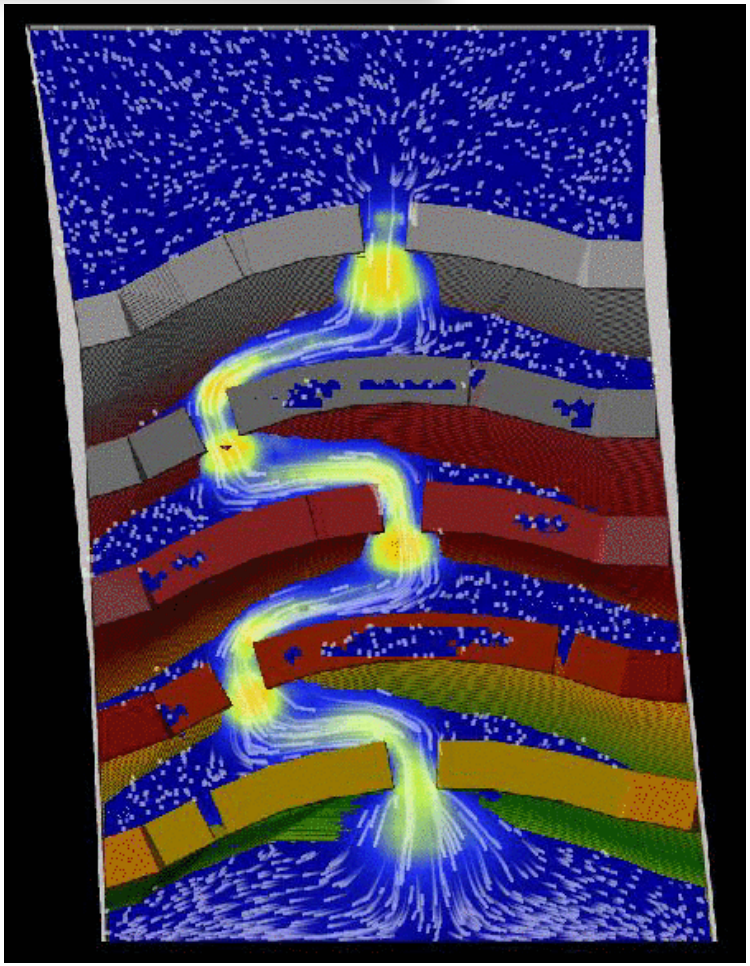
- 12m length with 1.2m drop (10% Slope)
- Offset flow path



Model Results

Fish Ramp Simulation:

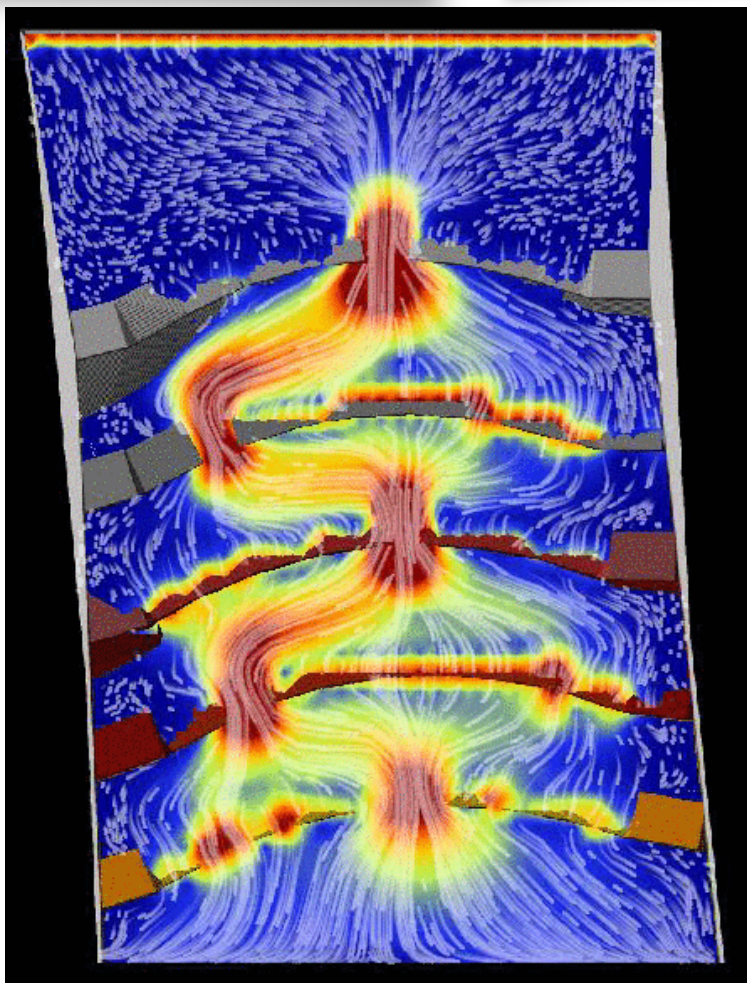
Flow = 0.05 m3/s



Model Results

Fish Ramp Simulation:

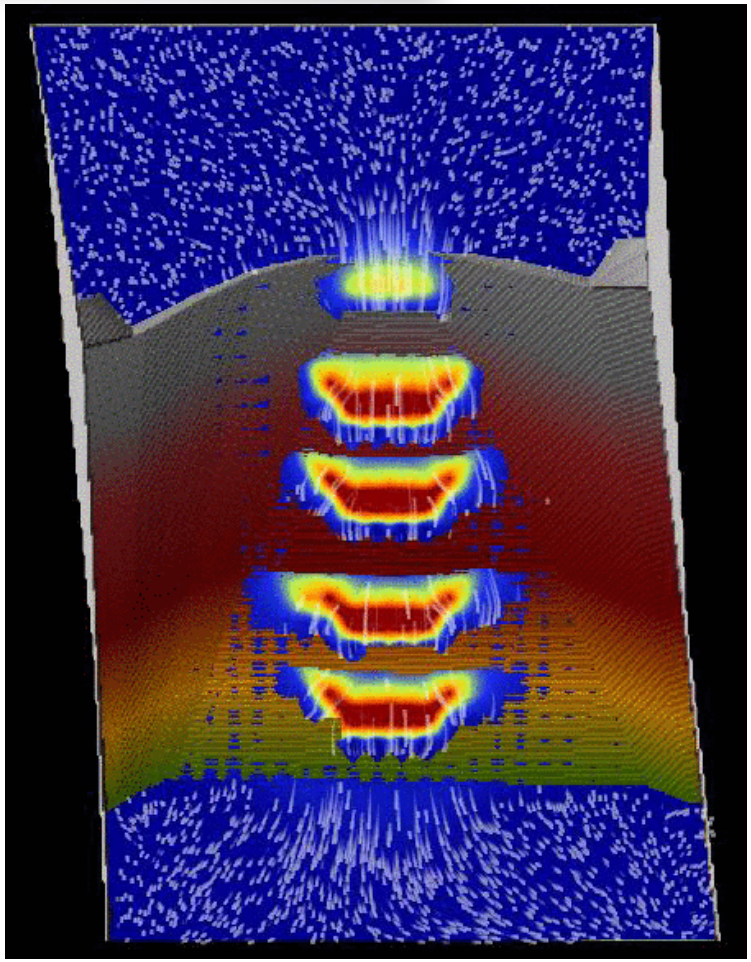
Flow = 1.0 m3/s



Model Results

Comparison of Fish Ramp Simulation to 10% sloped ramp with channel through center

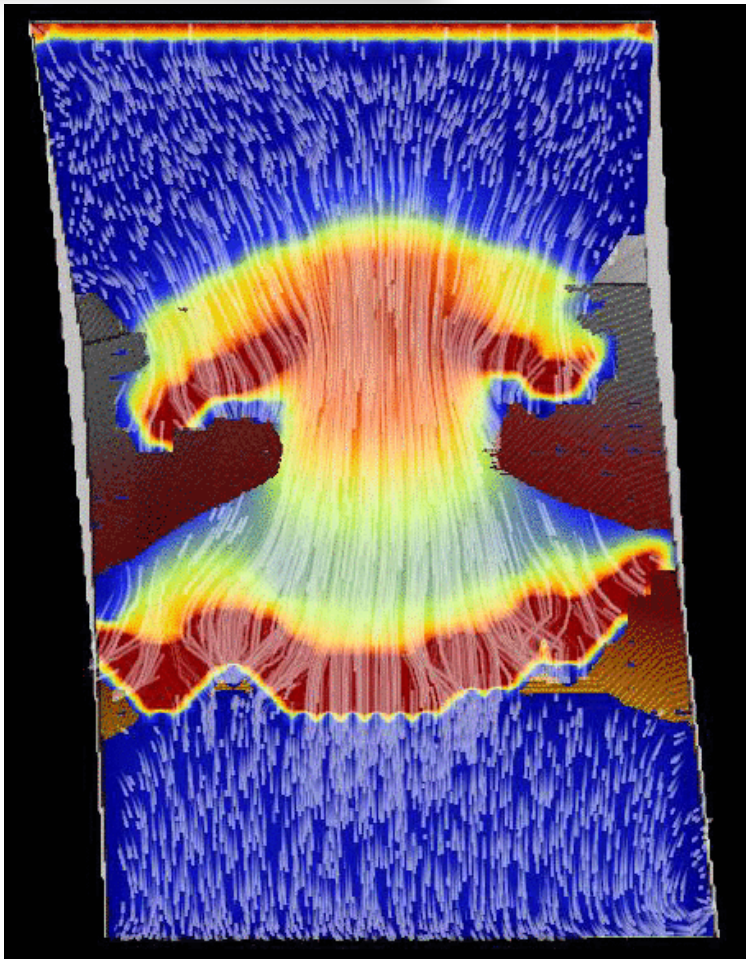
- Flow = 0.05 m3/s



Model Results

Comparison of Fish Ramp Simulation to 10% sloped ramp with channel through center

- Flow = 1.0 m3/s



Conclusions

- Design a fish ramp concept to overcome urban limitations
- 2-D hydraulic simulations
- Model results

Next Steps

1. Further Iterations on Design Concept
2. Sensitivity Analysis

Thank you.

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