

# Numerical Analysis and Optimal Management of a Fishway Model

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The need to preserve and enhance natural stocks of diadromous and resident fish have been recognized for, at least, the past century.

Dams cut off the migratory route of fish. A fishway or fish-pass is an hydraulic structure that enable fish to overcome obstructions to their spawning and other river migration, and is built whenever it is required, based on ecological, economical, or legal considerations.

The purpose of this work is to find the optimal form of fishway so that most many fish can go through rivers in the best conditions. The work involves modeling, mathematical analysis and numerical approximation of a coupled problem between a primal hyperbolic system and adjoint problem for the cost function of the optimal structure.

Our methodology combines two main approaches: The first one relies on Total Variation Diminishing (TVD) component-wise strategy to avoid field by field decomposition in the spatial discretization and also to design efficient and non oscillatory scheme. The second one uses a minimizing algorithm, the gradient of the cost function is evaluated by adjoint techniques and a gradient type method as an iterative solution of the discrete control problem is chosen.

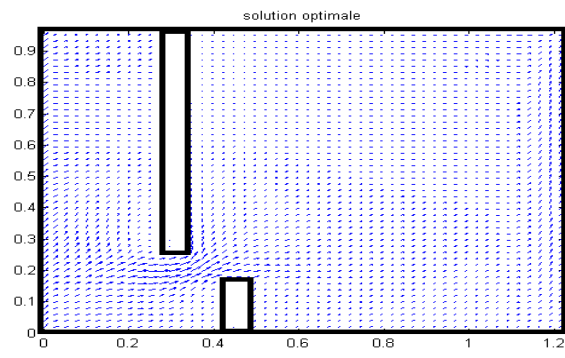
We show computational results which illustrate the accuracy of this technique.

## References

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Fishway



Optimal Structure