How to Simulate Quickly and Efficiently a Flow Over a Spillway ?

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Abstract

Flows over hydraulic structures, such as weirs or spillways, can be modelled using different techniques. New models such as SPH or PFEM are becoming more and more popular. These models are particle and/or meshless and consequently require a lot of computational power. Other methods such as VOF also require a lot of computational time (a few hours). In the frame of 2-D vertical flows, other techniques use much less computation time. For irrotationnal flows, solving the Laplace equation can be done very efficiently. The difficulty of this method lies in the definition of boundary conditions. The free-surface, which is naturally determined when using Lagrangian methods, needs a heavy iterative solving due to its non-linear nature when expressed in the frame of the Laplace equation. This paper will present an original technique that allows a quicker and easier determination of the free-surface. An irregular mesh for boundaries is used and discussed. The method is validated with analytical solutions and experimental measurements.

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