

A coupling strategy and its software implementation for waves propagation and their impact on coast

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For flows at the scale of wave propagation through oceans, it is natural to introduce simplified models, such as Boussinesq type. If they give accurate results in their range of application, they are unable to represent the flow near the coast, where waves break. One of the difficulties encountered here is to represent their potential effects such as shorelines with complex time-dependant free-surfaces, with possible multi-connected domains. Among all the strategies proposed, the Smooth Particle Hydrodynamics method (SPH) [4] can be effectively applied but at the price of a tremendous computational cost. The coupling between wave propagation models and complex free-surface flow strategies seems a promising way to tackle complex simulation from the open sea to the coast [2, 5]. The following questions arise:

- How to formulate an interface between two different physical models, with different discretization techniques?
- Is the coupling strategy stable (even if each sub-problem computation is stable)? [1]
- How to couple existing standalone software with maximum code re-use?

We propose to use a generic coupling strategy set in the Component Technology Framework [3], a paradigm that somehow extends the concept of object (in Object-Oriented Programming) with proper definition of communication between components. The implementation is made using the Component Template Library (CTL), an efficient middleware for scientific computations [6].

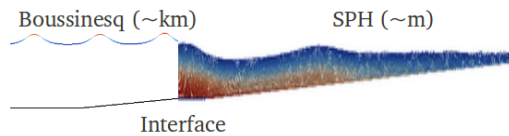


FIGURE 1. Coupled simulation with Boussinesq model on the left and SPH simulation on the right part

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