# Advancing Front Mesh Algorithm with Pseudo Islands for domains with very large wetting/drying areas.

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## ABSTRACT

This paper deals with an implementation of the advancing front method for generating triangular unstructured meshes for the solution of the shallow water equations in domains with very large wetting/drying areas. After the front initialization on the external and internal boundaries, internal fronts, around the so called pseudo islands, are created within the computational domain based on *a priori* node-spacing criteria. The element creation starts, several disjoint fronts are active, one for each pseudo island and for the external and internal boundaries, and the order of creation of the elements follows a front searching process locating always the smallest active side present in the front. In the end of the generation process the pseudo islands are deleted and replaced by triangles. The term pseudo island underlines the function of the triangle as a domain internal opening, like an island, which is included in the final mesh only when the discretization is completed (Mazzolari et al. 2014). Postprocessing routines are used to check and enhance the mesh quality: the Laplacian smoothing and diagonal swapping are used. The implementation shows very good results where the standard advancing front mesh algorithm ( Lo, 1985) fails to capture bathymetric discontinuities and very sharp slopes within the domain. A test case for an idealized geometry shows the effectiveness of the method with very high gradients on the node-spacing function within the domain. Light detection and ranging (LIDAR) digital elevation models are now available and describing in fine detail the bathymetry of coastal areas, estuaries and lagoons. A derived LIDAR bathymetry is used for demonstrating the improvement of the new advancing front version with respect to the standard version in meshing real world domains. Finally, a mesh obtained with the new implementation of the advancing front method is used in a very large wet and dry tidal propagation exercise, showing an improvement on the resolution of the high bathymetric gradients that influence the wetting and drying process and as a consequence an improvement on the simulation of the wetting and drying process (Mazzolari, 2013).

## REFERENCES

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