An Advanced Mesh Generator for Hydrodynamic Models
(poster presentation)

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The purpose of this research is the development and implementation of an advanced automatic mesh generator for hydrodynamic models. Starting with only a target element size and points defining the boundary and bathymetry/topography of the domain, the goal of the mesh generator is to automatically produce a high-quality mesh from this minimal set of input. From the geometry provided, properties such as local features, curvature of the boundary, bathymetric/topographic gradients, and approximate flow characteristics can be extracted, which are used to determine local element sizes. The result is a high quality mesh, with the correct amount of refinement where it is needed to resolve all of the geometry and flow characteristics of the domain. Techniques incorporated include the use of the so-called signed distance function, which is used to determine critical geometric properties, the approximation of piecewise linear coastline data by smooth periodic cubic splines, a so-called mesh function used to determine element sizes and control the size ratio of neighboring elements, and a force-displacement method which iterates to improve the element quality of the mesh. Meshes of coastal domains created by the new mesh generator will be compared to meshes of the same domain developed using existing mesh generation techniques. Figures of the meshes, along with element quality measures for the different mesh generation methods, will also be presented.