

MESH GENERATION TECHNIQUES FOR REPRESENTING COMPLEX COASTAL WATERSHEDS AND FLOODPLAINS

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We have developed a set of computationally efficient and robust mesh generation techniques that utilize high-resolution digital elevation models (DEMs) to automatically produce unstructured meshes that can accurately and efficiently represent the most relevant small-scales features and properties of watersheds and floodplains. The developed techniques are implemented within the ADMESH software package — an ADvanced MESH generation tool capable of automatically producing high-quality unstructured meshes from minimal user input [1].

The meshes are being developed to be used in a multidimensional, multi-physics modeling framework for coupled shallow water/overland flow that employs 2D (triangular) elements for shallow water flow, 1D line elements (element edges) for channel flow, and so-called kinematic or run-off cascades for overland flow. Constructing a mesh for this type of modeling approach that can accurately capture the most important features of the domain (e.g., shorelines, channel networks, ridges and watershed delineations), without becoming prohibitively expensive from a computational perspective and without sacrificing mesh quality, presents a number of challenges. We will discuss some of these challenges in detail and present results of the meshes produced using the developed mesh generation techniques.

REFERENCES

- [1] Colton J. Conroy, Ethan J. Kuatko, Dustin W. West, “ADMESH: An advanced unstructured mesh generator for shallow water models,” *Ocean Dynamics*, 62 (10-12), 1503–1517