

An adaptive finite element tsunami model prototype

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Abstract

Adaptive modeling techniques are applied to a finite element tsunami propagation model. In order to achieve efficiency, we employ several advanced techniques. Data layout is optimized using space-filling curves. Effective data management is performed by means of a gather-scatter paradigm. Triangular grids are created with a bisection mechanism and a simple automatic triangulation tool. These techniques are implemented in a parallel grid management library, *amatos*, which supports arbitrary order finite and spectral element methods.

The utilization of *amatos* is demonstrated in an adaptive shallow water based tsunami prototype application. With a simple gradient based refinement criterion the wave propagation is resolved with high accuracy.