Geophysical Research Abstracts, Vol. 7, 08803, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08803

The development of an unstructured grid approach to the modelling of the Indian Ocean Tsunami

D. Ham(1), J. Pietrzak(1) and G. Stelling(1)

(1) Environmental Fluid Mechanics Section, Faculty of Civil Engineering and Geosciences, Delft University of Technology (D.A.Ham@citg.tudelft.nl, +31152784069)

The recent Indian Ocean tsunami has raised the level of scientific and public interest in tsunami processes and their effects. The sparsity of field data in oceanography in general and for tsunami events in particular means that numerical modelling of the physics of tsunamis has an important role to play in the understanding of these phenomena. In addition, future tsunami warning systems for the Indian and, possibly, Atlantic oceans will rely heavily on advanced numerical models.

In this presentation, we look at the particular advantages that models based on unstructured grids bring to the problems of accurate tsunami modelling. Of particular importance in tsunami modelling is its behaviour in the coastal zone where the wave will be affected by and will impact on coastal islands and the coastline itself. Rapid changes in the bathymetry near the coast also have a significant effect on the tsunami.

Models based on unstructured grids are capable of accurately resolving coastlines and islands without the addition of multiple grid corner artifacts along those coasts. Unstructured grids also provide the modeller with the capability to concentrate the available degrees of freedom in particular regions. For example, it may increase the accuracy of a tsunami simulation to increase resolution in areas where the bathymetry changes rapidly. Conversely, the ability to reduce resolution away from areas of interest means that the total region simulated may be much larger than would otherwise be the case. This has the advantage that nonphysical boundary effects are less likely to impact on the solution in the areas of interest.

The results of simulations of the Indian Ocean Tsunami conducted with an unstructured grid finite volume shallow water model[1] will be presented and compared with the available satellite and surface observations. Particular attention will be paid to the

performance of the model near the Thai and Indonesian coasts.

References

[1] David. A. Ham, Julie Pietrzak and Guus S. Stelling. A scalable unstructured grid 3-dimensional finite volume model for the shallow water equations, Ocean Modelling (In Press)