Acceleration of Tsunami Numerical Computations Using Multiprocessors and Parallel Technologies

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Method of Splitting Tsunamis (MOST) [1] was adapted for multiprocessor parallel computations. Perspectives of performance optimization through comparison of different architectures and parallel techniques have been studied. Significant acceleration of computation process was achieved during tsunami propagation modeling. Optimization of the MOST algorithm makes it possible to achieve the performance gain of 16 times for 16 processors. This may reduce required calculation time for the tsunami propagation process from hours to minutes. This is of great importance for real-time processing of the data from tsunameters (deepwater ocean level detectors). The program was tested on the 2009 Samoa tsunami. The results of numerical modeling are in good agreement with actual tsunami records. Results of tsunami numerical modeling on video cards (GPU) are also promising.

Keywords: Tsunami propagation; numerical modeling; parallel computations.

References

[1] V.V. Titov, Numerical modeling of tsunami propagation by using variable grid. Proceedings of the IUGG/IOC International Tsunami Symposium, Computing center Siberian Division USSR Academy of Sciences, Novosibirsk, USSR (1989).