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Development of the system for high-precision prediction of coastal tsunami wave heights

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Meteorological Research Institute and Kokusai Kogyo Co. Ltd. developed the system for high-precision prediction of coastal tsunami wave heights by September, 2012. The integrated software for a series of tsunami numerical analysis of tsunami propagation and inundation was installed in this Windows 7 workstation-based system. Some functions were realized together with general-purpose software. Then, the system provides interactive operating environments to support following routine processes on tsunami numerical analysis.

1. Setting calculation regions and their nesting structure.

2. Setting the initial tsunami source by computing the crustal movement field from a fault model or a given sea-level distribution.

3. Preparing mesh data of bathymetry, elevation, coastal structures, and roughness parameters. This process includes datum transformations and merging two sets of mesh data.

4. Setting parameters and options, for examples, a normal tide level, presence or absence of tsunami run-up and non-linear effects, items to be output, locations of observation points.

5. The generation of program sources and executable files; then performing calculation.

6. Analyzing calculation result by visualizing various physical values, such as distribution and time-series of sea-levels or current velocity vectors, map of inundation area, moving images of them.

Basic data of bathymetry, elevation, coastal structures, and roughness parameters necessary to perform tsunami computing at along the Pacific coast facing Japan Trench or along the Pacific coast facing Nankai Trough were also prepared. This system has potential to improve research efficiency of tsunami numerical analysis. We will present some utilization examples at the meeting.

Keywords: integrated software, tsunami inundation computing, tsunami propagation computing, flow visualization