Tsunami run-up and inundation simulations using LexADV_EMPS solver framework on Fujitsu FX100

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1. Development of the parallel explicit MPS solver framework “LexADV_EMPS”

1.1 Objectives

1.2 Software overview

1.3 Bucket-based domain decomposition

1.4 Dynamic load balancing

1.5 Basic performance measurement

1.6 Example of implementation of distributed-memory parallel explicit MPS solver by LexADV_EMPS

2. Tsunami run-up and inundation simulations

2.1 Overview

2.2 Kesennuma city

2.3 Fukushima Daiichi Nuclear Power Station

Table 1: Computational performances of LexADV_EMPS and its kernel functions in a 3-dimensional shallow-water simulation with 130 million particles using 12 computer nodes of FX100.

Table 2: Computational performances of LexADV_EMPS at the second stage analysis. The number of particles is about 250 million, and the analysis time is 1.8 seconds.

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Fig.7 Target areas

Fig.8 First stage analysis by using the 2D shallow-water analysis from epicenter to coast areas.

Fig.9 Tsunami running-up and inundated simulation for Kesennuma city.

Fig.10 Validation of inundation map between aerial photo and computer simulation results.

Fig.11 Tsunami running-up and inundated simulation for Fukushima Daiichi Nuclear Power Station.

Fig.12 Inundation area by using the LexADV_EMPS.