

# Development of Simulation Technology for Seismic Behavior of Large Plain and Slope Failure

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## Abstract

It is an effective way of mitigating earthquake disasters to predict strong ground motions or related phenomena and to take countermeasures against earthquake disasters. Large area, broadband, and high-accuracy simulations such as seismic wave propagation analyses or analyses of slope failure based on theoretical method lead to large scale computation models. However, it is difficult for normal PC Cluster systems to run these simulations due to the limitation of computing ability. Therefore, we have make possible to perform computation using Earth Simulator (ES). Ported programs are three. One is K-fdm3d calculating seismic wave propagation based on physics of seismic source and elastic wave theory, the second is an earthquake response analysis program for subsurface ground, SuperFLUSH/3DS, and the last is K-dem simulating slope failure.

Using K-fdm3d, the large scale simulation of seismic wave propagation for a senario earthquake caused by Uemachi Fault located in Osaka Basin that may cause severe damage has been conducted using the ported program. The performance was about 90 times faster than our PC cluster system. As for SuperFLUSH/3DS and K-dem, we have conducted some experimental analyses using ported programs, and clarify the tasks to improve performance.

**Keywords:** Wave Propagation, Ground Response, Slope Failure, FDM, Frequency Response Analysis, DEM