

Numerical modeling of Kamaishi offshore tsunami barrier against Tohoku earthquake tsunami

MORI, Nobuhito^{1*}, Nozomu Yoneyama¹, Masaki Miwa¹

¹Disaster Prevention Research Institute, Kyoto University

At 14:46 local time on March 11, 2011, a magnitude 9.0 earthquake occurred off the coast of northeast Japan. This earthquake generated a tsunami that struck Japan as well as various locations around the Pacific Ocean. Based on the post-event tsunami survey, the regional and local scale analyses were conducted to understand the basic characteristics of this event. It is possible to verify the effectiveness of tsunami counter measure by this event. This study simulated tsunami inundation in Kamaishi bays targeting Kamaishi offshore wave barrier.

A series of numerical simulation was performed by quasi-three dimensional and full three dimensional (Navier-Stokes equation) model. The spatial resolution was 25-50m depends on the target and size of target area was 12 km by 10 km around Kamaishi and Ryoishi bays. The offshore boundary condition was given by GPS wave gage at offshore of Kamaishi bay.

The validation of numerical models was conducted against to post-event tsunami survey data on the land. Both numerical models slightly over predict against the survey data but they gave reasonable agreement with the data. The offshore barrier in Kamaishi bay reduced the tsunami height inside of Kamaishi bay about 30-40% in comparison with no-barrier case.

Keywords: The 2011 Tohoku Earthquake Tsunami, Kamaishi bay, Wave barrier, Numerical modeling, Velocity profile