

# 琉球大学学術リポジトリ

## 実験及び数値計算による津波力及び津波減災の研究

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Abstract

Title Experimental and Numerical Investigations on Tsunami Acting Force and Tsunami Mitigation

実験及び数値計算による津波力及び津波減災の研究

Frequent natural disasters show the catastrophic effect on the coastal communities. The Tohoku region coastal communities of Japan have experienced a recent terrifying effect of giant tsunami wave in 2011. The Indian Ocean tsunami in 2004 triggered one of the worst natural hazards in human history. Tsunami overtopped sea wall which ran into buildings forming bore wave, destroyed walls of buildings and windbreak forestry. Coastal communities should have both well designs building structure and strong countermeasures. This study exists two sections: tsunami acting phenomena on building and then tsunami mitigation by canal. Series of laboratory experiment have been carried out for both experimental simulations. Simple building model structure was considered for several initial tsunami heights. The distributions of the pressure history on the front section of building models are shown. This distribution reveals that tsunami acting on building can have different distribution pattern which depends both tsunami height and tsunami velocity. Then tsunami mitigation by canal experiments were conducted which showed canal can reduce tsunami velocity and it can also prolong tsunami arrival time. Numerical simulation with the newly improved Moving Particle Semi-implicit (MPS) method has been performed here to validate with the physical canal experimental results, it showed good agreement with the experiments. Then the numerical simulation was applied to check the combined countermeasures (canal and dune) model condition. Canal showed good contribution in combined countermeasures, it can not only reduce the velocity, but also it can reduce tsunami inundation depth. This study shows that tsunami acting on building depends on tsunami height and tsunami velocity around the structure; it also showed that canal can be important countermeasures against tsunami. This study also showed that MPS method can be applied tsunami related study.

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