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Impact Simulation due to TSUNAMI waves by Finite Element Codes

SARUWATARI, Tomoharu* and SHIBANO, T Shinji

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SUMMARY

We studied building wall transient deformation by TSUNAMI impact force.

We use two phase approach. Such as we studied TSUNAMI wave propagation on a horizontal city surface using commercial base CAE code and get pressure distribution on a building wall at Phase-1.

At phase-2, we studied building transient deformation by TSUNAMI impact force which got from phase-1.

In Phase-1, we use general purpose CFD (Computational Fluid Dynamic) Code called "AcuSolve".

This software can treat surface deformations by ALE methods.

Using ALE methods, we can get reasonable wave propagation results is a short time in comparisons with other VOF (Volume Of Fluid) based code.

The reasons are as follows;

1) Because VOF methods requires very fine mesh near surfaces, but ALE need not use such fine mesh.

2) Because ALE methods always can trace surface correctly, we can detect always surface position exactly.

3) Because ALE methods detect always surface position exactly, we can take into account density jump on the surface correctly.

4) from above reasons, we can estimate impact force on a building walls correctly.

In Phase-2, we use general-purpose Structure analysis code called "LS-DYNA".

LS-DYNA is a general-purpose multiphysics solver developed by Livermore Software Technology Inc. This software has been widely used to simulate the impact of mechanical design and architectural design, there is a feature that is suitable to analyze the structure and the fluid coupling.

Finally, we have done general TSUAMI impact force analysis procedures by general purpose codes.

This shows you can estiname sturucture deformation by TSUNAMI for most buildings.