

PRESSURE AND STRESS ANALYSIS OF LIQUID-FILLED CYLINDRICAL TANK

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January 15, 2021

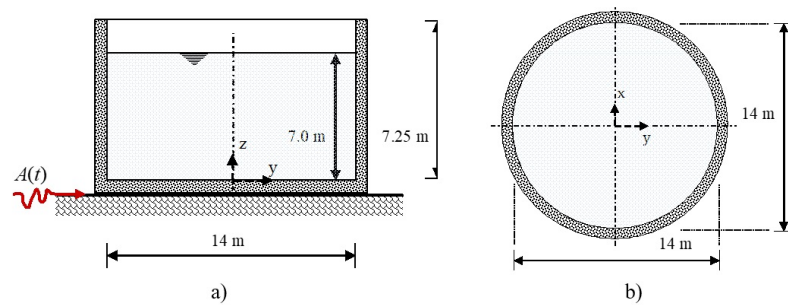
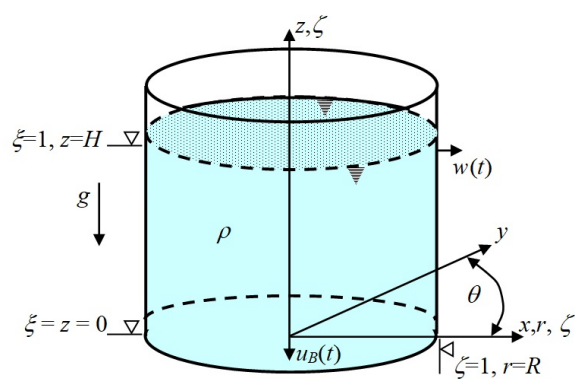
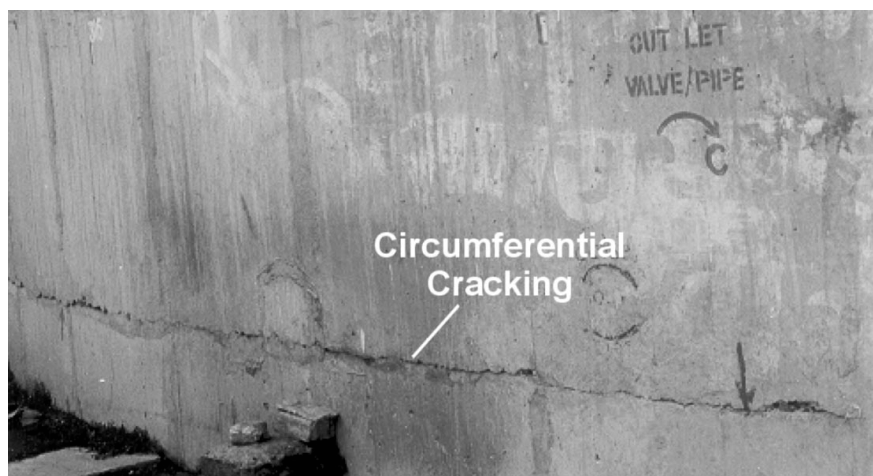
Abstract

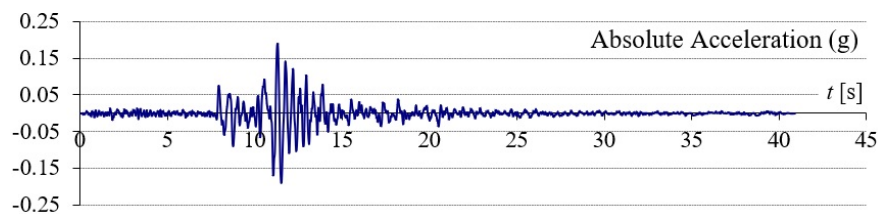
During earthquakes, the liquid-filled storage tank generates hydrodynamic pressures, in addition to hydrostatic pressure, on the solid domain of the tank. The theoretical background of hydrodynamic pressure analysis, as well as the numerical simulation of the liquid-filled cylindrical concrete tank, is the focus of this paper. The Finite Element Method (FEM) modeling, along with Arbitrary Lagrangian-Eulerian and Fluid-Structure Interactions formulation, are used for simulating the seismic response of cylindrical concrete liquid-filled tank, fixed to the rigid foundation. The Loma Prieta accelerogram is utilized for recording the seismic ground motion. In the numerical study, two states are observed: 1) static condition where only hydrostatic pressure acts, and 2) seismic excitation where hydrodynamic pressure occurs. When exposed to an earthquake situation, the tank liquid gives the total pressure of the liquid domain. The dynamic analysis considers the pressure response of the liquid domain, as well as the stress response of the solid domain of the coupled system, i.e., liquid-filled cylindrical concrete tank.

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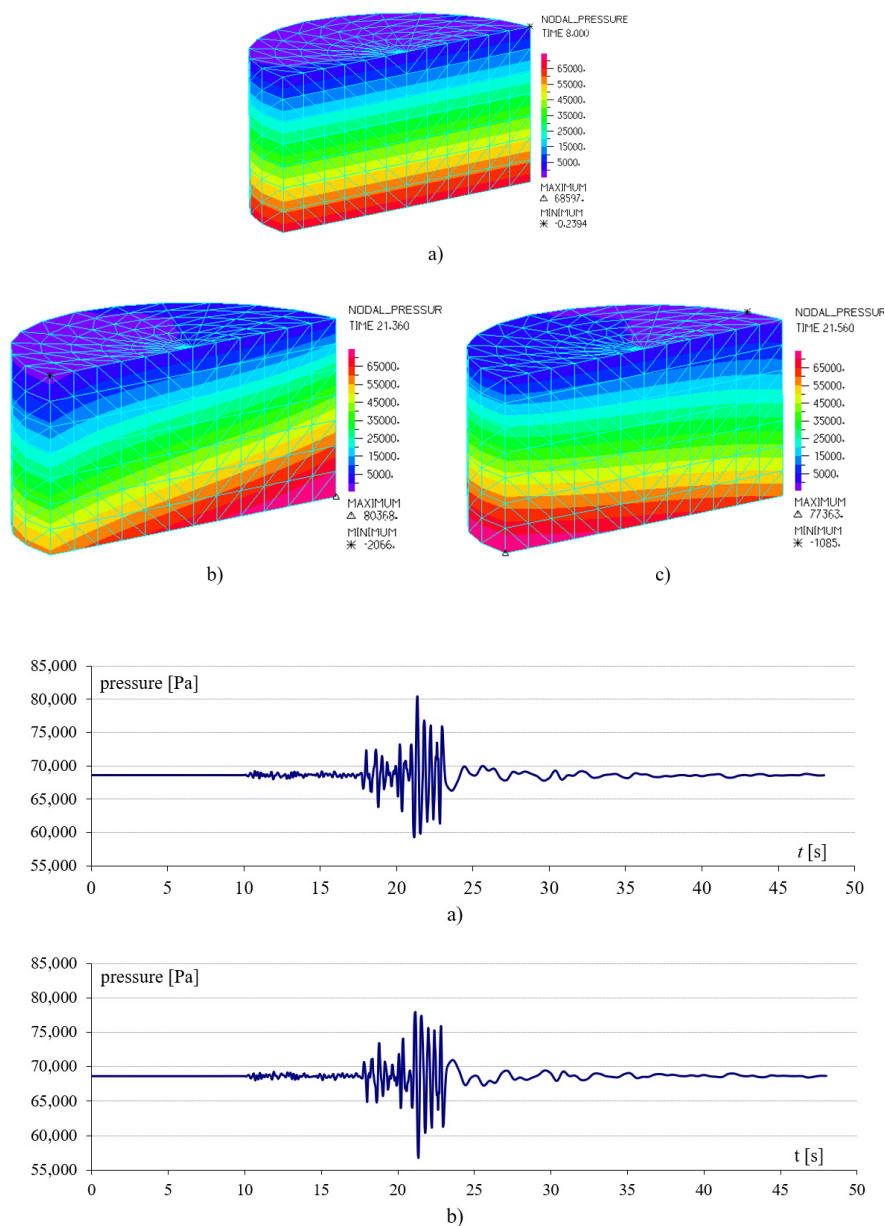


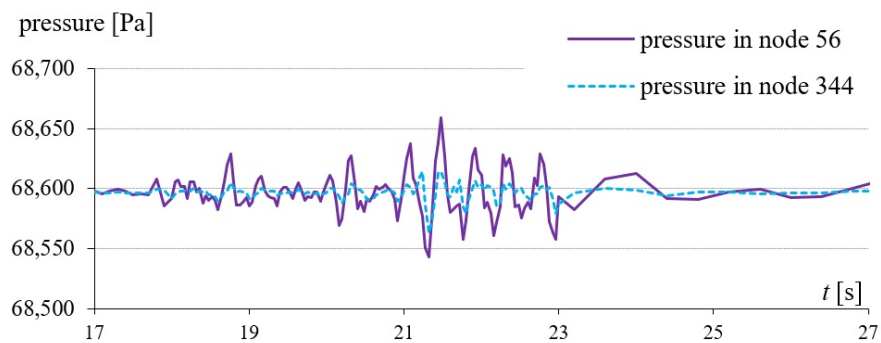
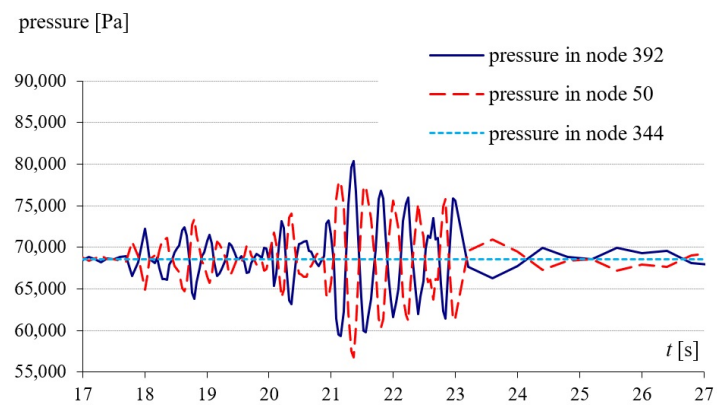


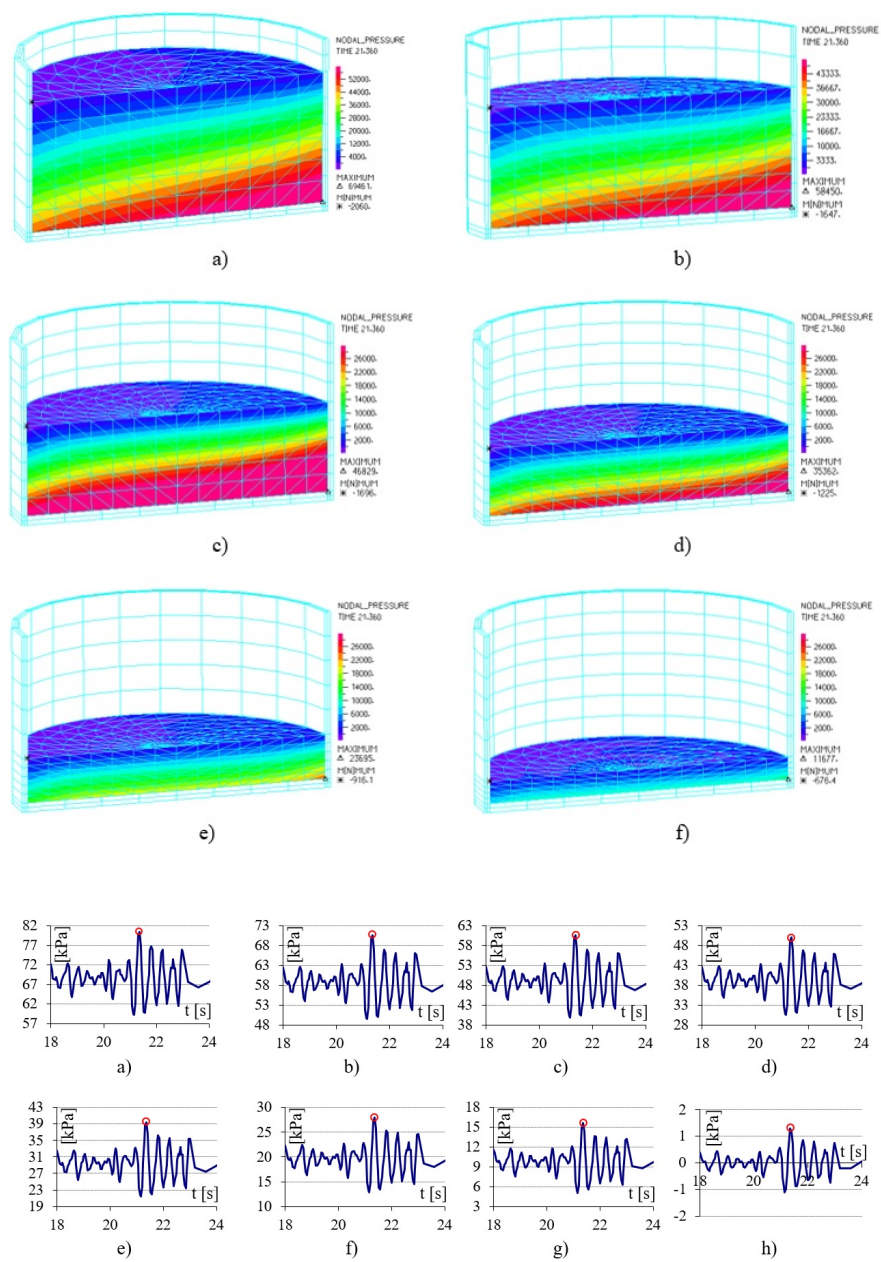


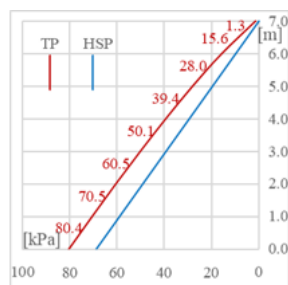
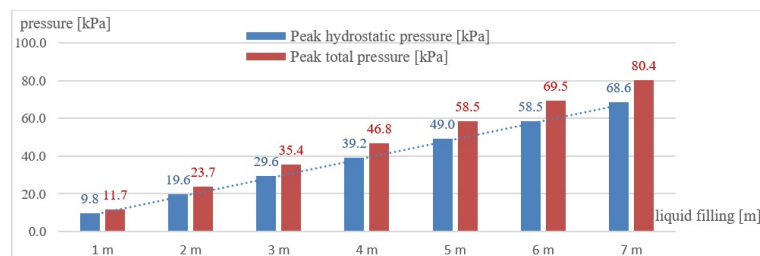
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Figure 6.tif available at <https://authorea.com/users/389672/articles/504254-pressure-and-stress-analysis-of-liquid-filled-cylindrical-tank>

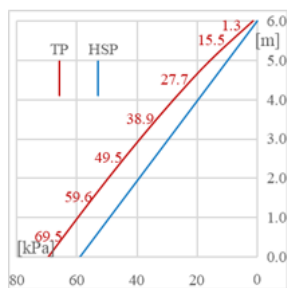




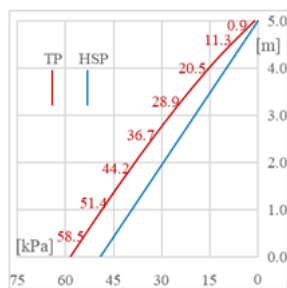




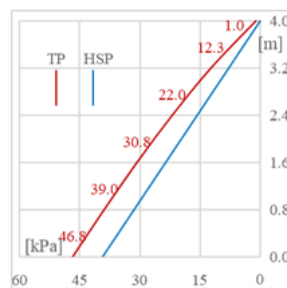
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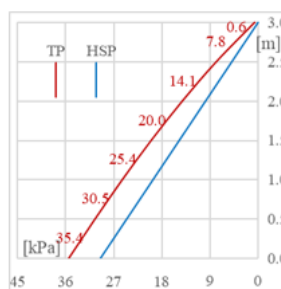
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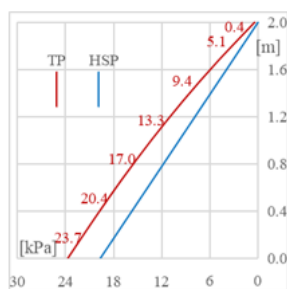
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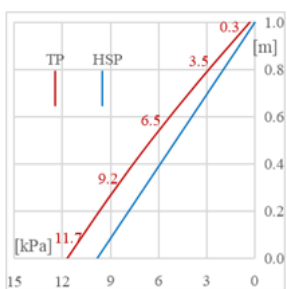
d)



e)



f)



g)

Element 64, Node136

