I. Strength Evaluation of Corroded Members
II. Deformation Analysis for Flexible Structures

Naohiko WATANABE

Associate professor, Dr. Eng.
Email : watanabe@gifu-nct.ac.jp

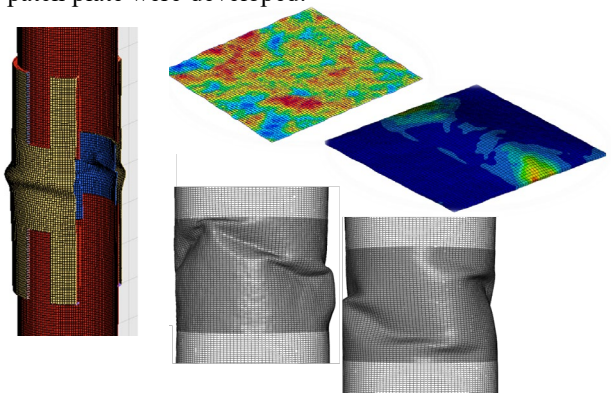
Research Fields Structural Engineering

Keywords corrosion, buckling, unstable, generalized inverse, sloshing

Research Outline

Evaluation of Ultimate Strength of Corroded Steel Members and Repaired Structures

Offshore steel structures exposed in corrosive environment are needed proper maintenance and repair to protect against degradation of their structural properties. We have dealt with properties of corroded member having irregular thickness and repaired member with patch plates, through measurements, experiments and analyses for the purpose of evaluating their load carrying capacities. Through FE analysis with the corroded member model simulated by a spatial autocorrelation model, a simple formula to estimate equivalent thickness was derived. We also conducted experiments about corroded steel pipe piles repaired with underwater welding, focusing on the material properties and structural properties. And, a simplified analysis model to evaluate strength of member welded patch plate were developed.

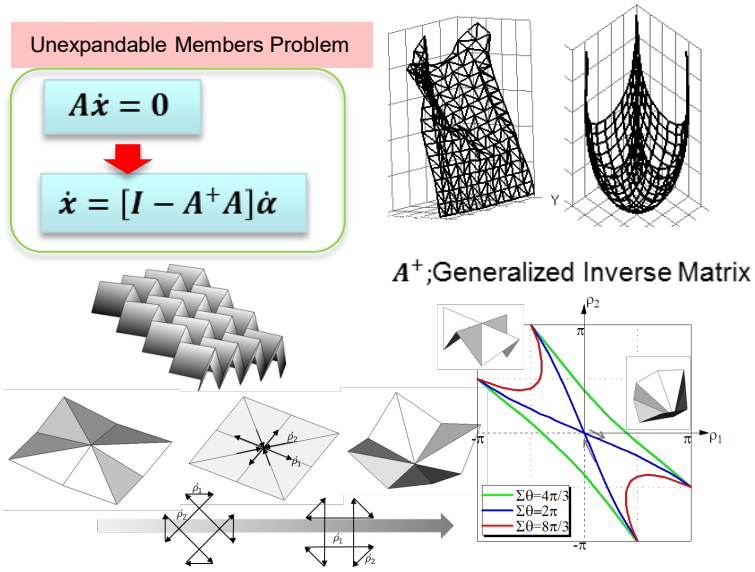


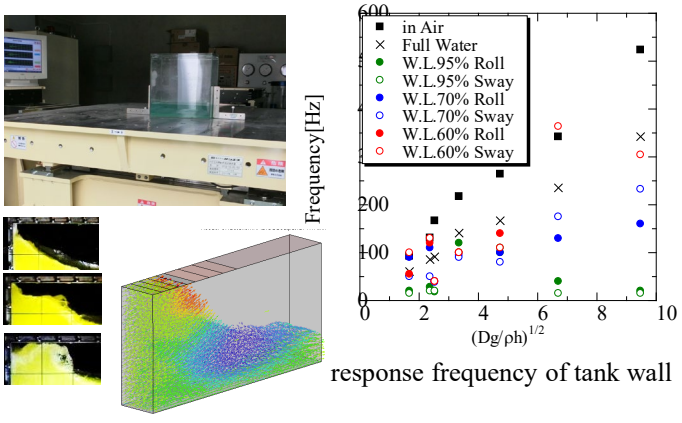
Sloshing Response of a Storage Tank

Earthquake causes severe damage to storage tank due to a sloshing. For an accurate estimation of a sloshing response, we made a classification of sloshing impact pattern, and investigated the relationship between sloshing impact and dynamic response, based on huge amount of experimental results. We proposed a calculation method of the dynamic amplification of tank wall considering the added mass of water.

Deformation Analysis for Flexible Structures

Flexible structures are novel and unique type of structures which can be a smart solution for effective transportation and quick assemblage. We have formulated with using the generalized inverse matrix to simulate a deformation of the **rigid foldable model** which is unstable structure made up of many panels and hinges, and organized a condition of rigid foldability. To introduce a mechanical index to evaluate efficiency of folding is in a future work.





response frequency of tank wall