

# HYDRODYNAMIC BEHAVIORS OF LARGE STEEL-CYLINDRICAL COFFERDAM SYSTEM FOR MARINE STRUCTURES CONSTRUCTION

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## INTRODUCTION

Some cofferdam systems have been applied for marine structures construction of bridges, marine foundation, and etc. Recently, new cofferdam system using large steel-cylindrical members proposed to reduce marine working periods and to improve economic of marine working. In order to construct marine cofferdam system with large steel-cylindrical members, (step 1) some modules composing of a large steel-cylindrical cofferdam system fabricate with typical height in steel factory, and (step 2) move to the construction site onto the barge towing. Then, (step 3) large steel-cylindrical cofferdam system completes by module to module connection with vertical direction in seawater. Finally, (step 4) inside water of large steel-cylindrical cofferdam draw out by pumping, and (step 5) the marine structures are constructed under land based conditions. This cofferdam system has advantages to reduce marine working period and to secure structural safety uniformly.

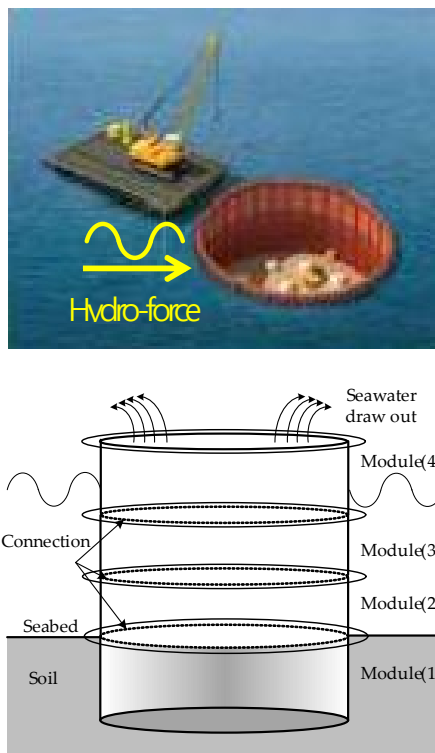


Figure 1 - Large steel-cylindrical cofferdam system

## HYDRODYNAMIC ANALYSIS

In this study, hydrodynamic behaviors of large steel-cylindrical cofferdam system were investigated analytically. Marine condition corresponding to return period 10 years applied based on the marine working periods and DNV-OS-H101. Hydrodynamic analysis was carried out by ANSYS-AQWA and structural analysis was carried out by ANSYS Mechanical interfaced with

hydrodynamic pressure mapping. Structural behaviors of stress and deformation were evaluated and compared to the each load of static water pressure, wave force, and current force, respectively.

As the results of this study, it was found that the static water pressure significantly influenced on the flexural stress. However, in respects of structural design, cross-sectional shear force causing by hydrodynamic force of wave and current governed structural design. Also, in order to exactly connect and disconnect module to module into the seawater, it is important to maintain origin circle shape, namely to minimize circle deformation under marine condition. As the results of this study, maximum deformation indicated below 5.0mm. Therefore, it was concluded that there is few problems in module to module connection and disconnection into the seawater due to the shape deformation.

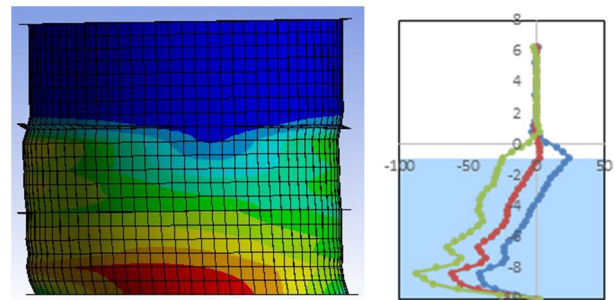


Figure 2 - Structural behavior

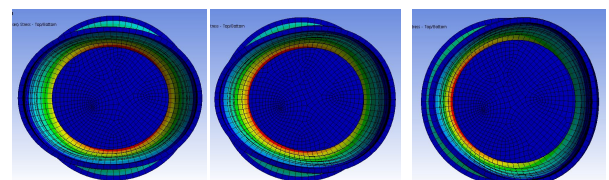


Figure 3 - Deformation to wave passing

## CONCLUSIONS

In this study, hydrodynamic behaviors of large steel-cylindrical cofferdam system were investigated analytically. Also, design shear force at the module-module connection part was evaluated. Based on the hydrodynamic behaviors, advanced cross-section of large steel-cylindrical cofferdam system was proposed so as to efficiently resist to hydrodynamic shear force and possible to reduce total weight of large steel-cylindrical cofferdam system.

## ACKNOWLEDGMENT

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