

## Development of a Fluid-Structure Interaction Method with Free Surface Using IGA

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There have been presented a number of numerical methods for fluid-structure interaction problems with free surface. The finite element method is widely used as a numerical method. Although the finite element method has excellent adaptability to arbitrary shapes, it is time-consuming to create an analysis mesh, and curves may be approximated. Therefore, IGA (Isogeometric Analysis) [1], [2] has been attracting attention in recent years.

IGA is a method using NURBS functions used in CAD (Computer Aided Design) as a shape function. IGA can create an analysis mesh directly from CAD data, enabling us to create an analysis mesh easily and represent curves perfectly.

The purpose of this study is to develop a fluid-structure interaction analysis method using IGA. For fluid analysis, the numerical method based on VOF method is employed. The stabilized finite element method with IGA is applied as the spatial discretization method and the Crank-Nicolson method as the temporal discretization method. For structure analysis, to solve the equilibrium equations, the Galerkin method with IGA is employed as the spatial discretization method and the Newmark-beta method is employed as the temporal discretization method. Several numerical examples are presented to demonstrate the promise and potential of the present method to solve the solid-fluid interaction problems with free surface.

### REFERENCES

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