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## 混相流解析，連成解析の工学応用

Engineering application of multi-phase and coupled simulation

多分野融合による物理メカニズム解明に向けて  
Toward understanding of physical mechanism  
based on multidisciplinary analysis

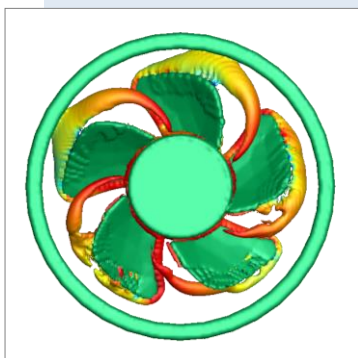
Keyword：混相流，連成解析，数値流体力学  
Multiphase Flow, Coupled Analysis, Computational Fluid Dynamics

種々の流体現象の解明と把握，また流体関連機器の高性能化のため，数値流体解析手法の開発と応用に取り組んでいます。数値解析は，現象の予測と設計の高精度化のためには今や必須のツールで，特に実験・計測が困難なミクロスケールの現象や極限状態，また非常に複雑な現象の可視化と予測等に効果的です。私は直交格子と埋め込み境界法を用いて，熱流体，壁乱流，固気二相流，気液二相流，混相流，流体構造連成等の解析技術の開発を行い，様々な企業，研究所との産官学連携研究に応用しています。

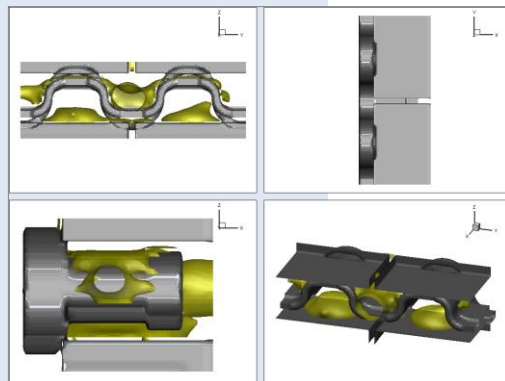
混相流は単相流とは異なり，相間の流れのエネルギー授受過程や流動様式が複雑化しがちで未だに解析が困難です。また流体構造連成などの多分野連成問題も未だに正確な解析が難しい分野です。私はこれらの気液二相流解析や構造連成解析を開発，応用し，様々な研究開発を行っています。

Numerical methods based on Computational Fluid Dynamics (CFD) are studied to solve flow phenomena for realizing high performance of engineering products. Numerical simulations which can be used for the prediction of physical phenomena and the design of products are essential and effective, especially for the micro scaled problems, extreme conditions and visualizations. An immersed boundary method and Cartesian mesh method are exploited in this study to investigate thermo-fluid, wall-turbulence, multi-phase flow and fluid-structure interaction on collaborative researches with companies and research institutes.

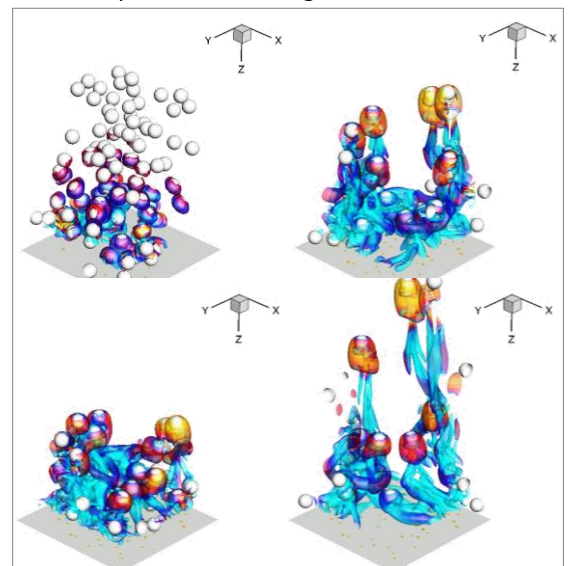
It is still difficult to solve the multi-phase flow that shows complicated energy conversion mechanism and flow structures due to the interaction of the phases. The multidisciplinary problem such as fluid-structure interaction is also one of the crucial studies. Numerical methods to apply the significant and practical applications are developed and investigated in this study.



埋め込み境界法による回転機械の数値解析  
Numerical simulation of rotating machinery  
with immersed boundary method



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Two-phase flow simulation around piston ring model



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