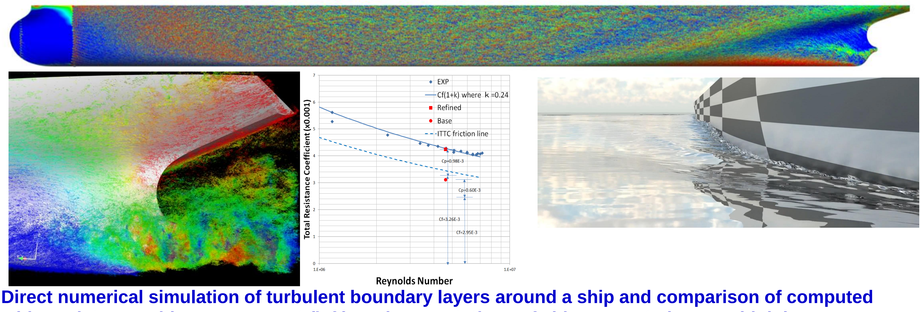
東京大学生産技術研究所
Institute of Industrial Science, The University of Tokyo

# Center for Research on Innovative Simulation Software

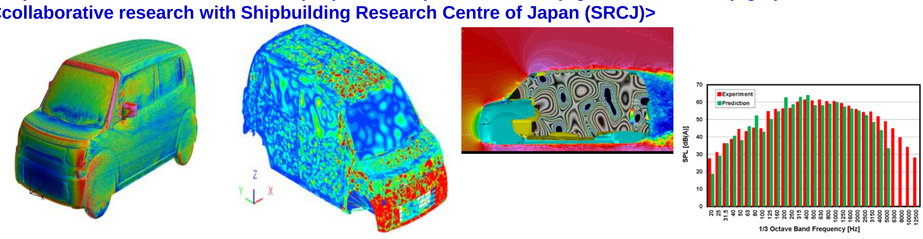
## Conducted Research on Manufacturing and Environment

## Simulation for Ship and Vehicle

【*Kato. Lab.*】



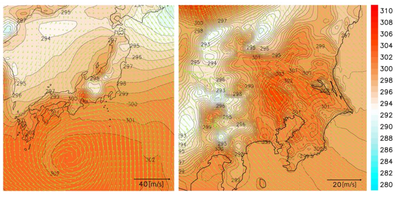

Direct numerical simulation of turbulent boundary layers around a ship and comparison of computed ship-resistance with measurement (left), and computations of ship-generated-waves (right)
<collaborative research with Shipbuilding Research Centre of Japan (SRCJ)>




Coupled simulations of external-fluid flow, panel vibration, and interior acoustics to predict cabin noise
<collaborative research with Toyohashi University of Technology and SUZUKI MOTOR CORPORATION>

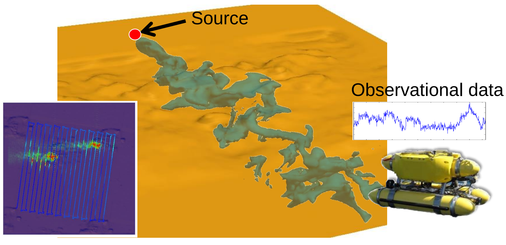
## Environmental Simulation

【*Ooka. Lab.*】



Numerical estimation of local climate using WRF
left: Typhoon No.10, right: Heat island effect

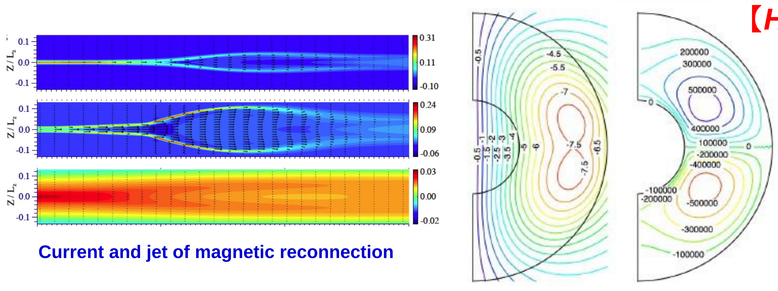
【*Hasegawa Lab.*】




Estimating a scalar source by integrating flow simulation and measurement by robots

## Magnetohydrodynamic Turbulence

【*Hamba Lab.*】



Current and jet of magnetic reconnection

Magnetic field and helicity of rotating spherical shell

http://www.ciss.iis.u-tokyo.ac.jp

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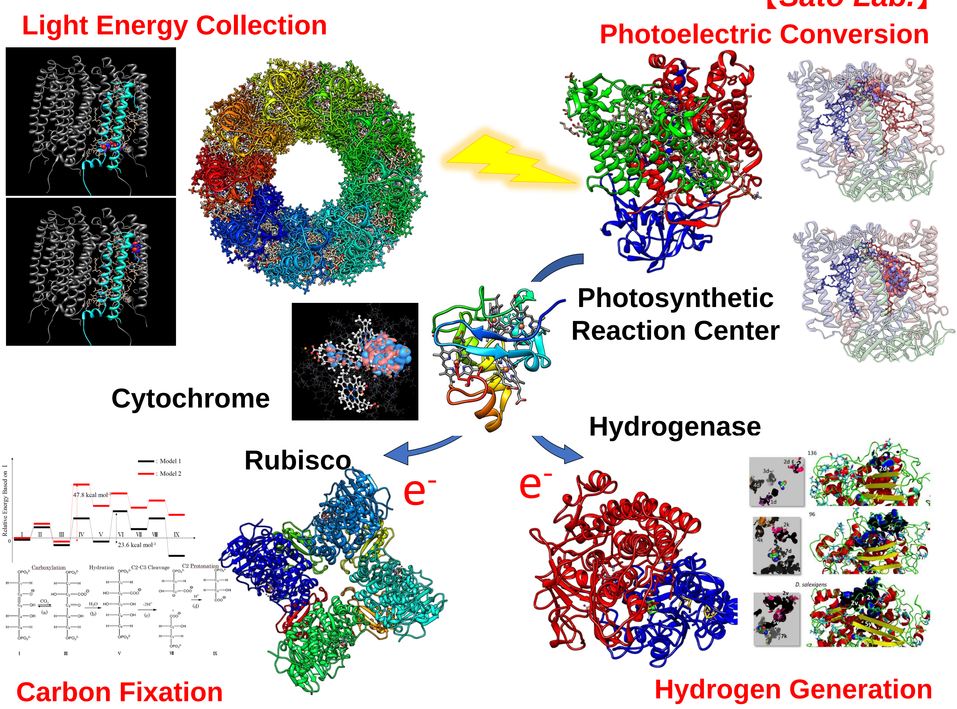
# Center for Research on Innovative Simulation Software

## Conducted Research on Biotechnology and Medical Engineering

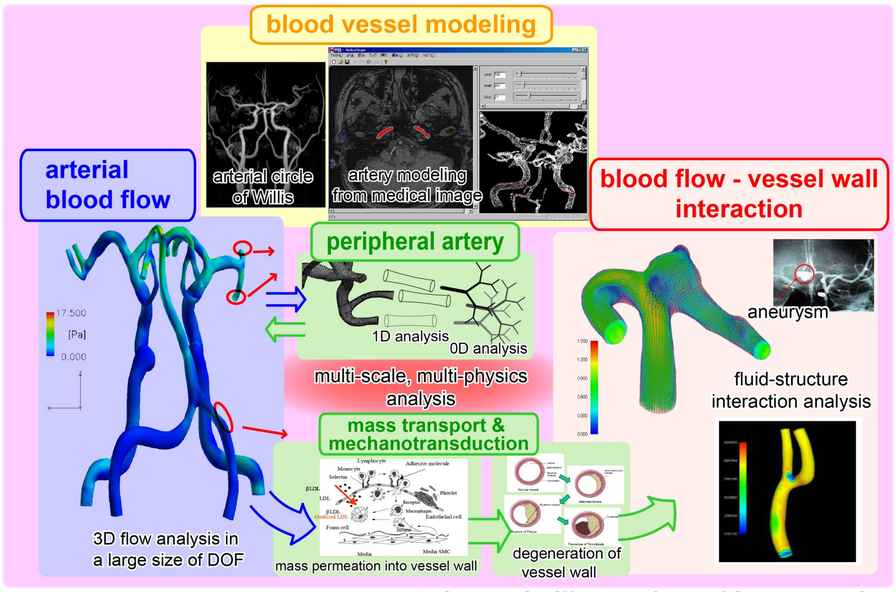
### Functional Proteins and High Performance Design

【*Sato Lab.*】




### Multi-scale and Multi-physics Simulation for Circulation

【*Oshima Lab.*】




**Schematic illustration of integrated simulation system "M-SPhyR Circulation"**

http://www.ciss.iis.u-tokyo.ac.jp

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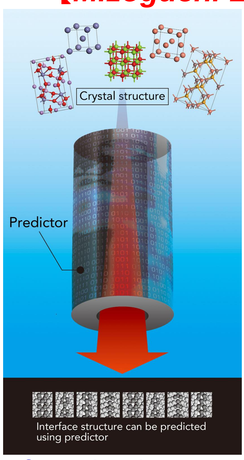
# Center for Research on Innovative Simulation Software

## Conducted Research on Material Properties

### Machine learning for interface

【*Mizoguchi Lab.*】

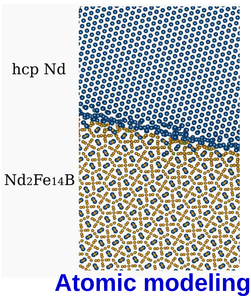



Interface structure determination using Artificial Intelligence (AI)

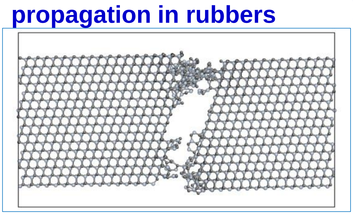
### Multiscale Simulation for Material Structure, Deformation and Fracture

【*Umeno Lab.*】

FEM simulation of mode transition of crack propagation in rubbers



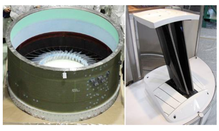

Atomic modeling of neodymium magnet interface



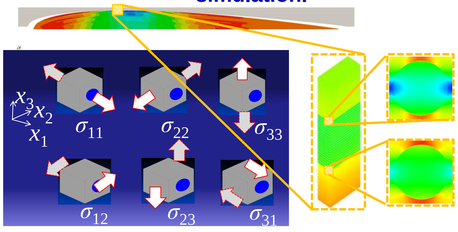
Atomic modeling of fracture in SiC crystal

### Multi-scale simulator to develop high-efficiency CFRP jet engine

【*Yoshikawa Lab.*】

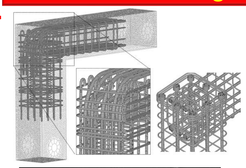


Defects evaluation of thermoplastic molding member has been performed by zooming simulation.

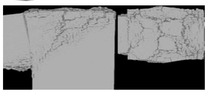



### Artifact monitoring

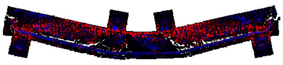
【*Nagai Lab.*】



Failure of beam-column joint part of reinforced concrete by RBSM



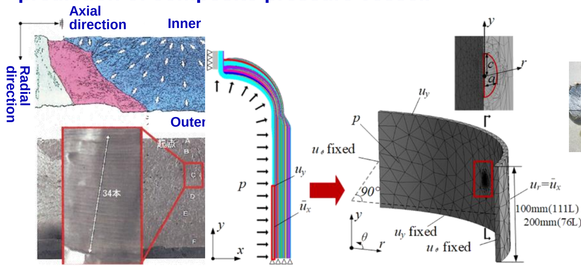
Residual structural performance of corroded reinforce concrete



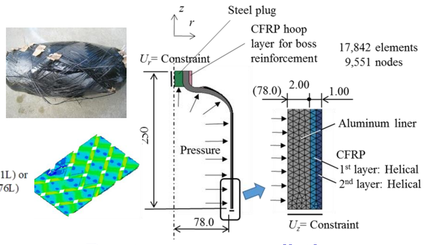
### High Performance Computing for hydrogen society promotion

【*Yoshikawa Lab.*】

Meso-scale simulator has been developed for accurate fracture prediction of composite pressure vessel.




Pressure cycle life prediction by crack propagation simulation




Burst pressure prediction by meso-scale simulation