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

Research and Developments of HPC Simulation Technology and Industrial Application of the Technology

Aiming at Innovation in MO-NO-DU-KU-RI

High performance simulation software drastically changes engineering

Center for Research on Innovative Simulation Software (CISS) was founded to conduct R&D on the advanced and practical computational science simulation software utilizing hyper-large-scale simulations represented by the supercomputer “Fugaku” for the next hyper-simulation era. We aim at

- ◆Conducting world-leading advanced research on hyper-large-scale simulation software
- ◆Strengthening the educational foundation to educate how to make and use hyper-simulation software for industrial application
- ◆Putting R&D results in common industrial use to enhance global competitiveness of domestic engineering

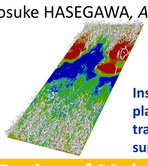
Research and development fields and Research Members

Manufacturing

Engineering for propulsion conversion
Chisachi KATO, *Center Director/Prof.*

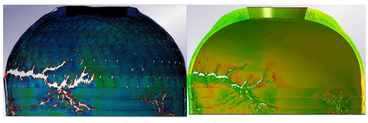
Numerical simulation of hull boundary layer and wave resistance (Courtesy of Shipbuilding Research Centre of Japan)

Engineering for optimized design
Yosuke HASEGAWA, *Associate Prof.*



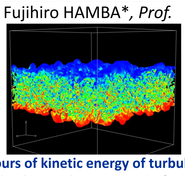
Instantaneous turbulent flow over a flat plate under optimal control for heat transfer enhancement and friction drag suppression

Reliability engineering
Nobuhiro YOSHIKAWA, *Center Vice Director/Prof.*



Developing high pressure hydrogen tank supported by meso-scale simulation

Mathematics of turbulence
Fujihiro HAMBA*, *Prof.*



Contours of kinetic energy of turbulent diffusion in rotating system. Red denotes right-handed helical motion and blue denotes left-handed helical motion.

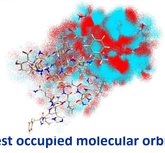
Large-Scale Data Analysis

Large-scale data analysis engineering
Kenji ONO, *Visiting Prof.*

Web-based workflow system WHEEL

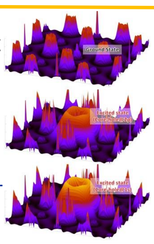
Design of Molecular and Nanoscale Materials and Devices

Biomaterial engineering
Fumitoshi SATO. *Prof.*



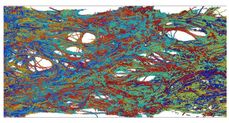
Highest occupied molecular orbital of insulin drawn by cloud-like model

Material science and creation
Teruyasu MIZOGUCHI*, *Prof.*



Wave function at the bottom of the conduction band of MgO at (top) ground state, (middle) core-hole state at Mg2p orbital, and (bottom) core-hole state at Mg1s orbital

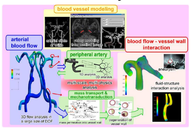
Applied material engineering
Yoshitaka UMENO, *Associate Prof.*



Deformation of Polycarbonate by Coarse-Grained Particle Model Simulation

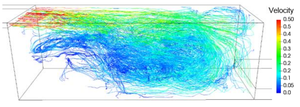
Medical engineering/Urban safety

Medical engineering
Marie OSHIMA*, *Prof.*



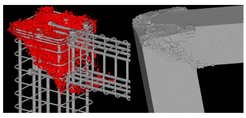
Schematic of integrated simulation system “M-SPhyR Circulation” (Multi-scale and physics simulator for circulation)

Urban energy engineering
Ryozo OOKA*, *Prof.*



Analyses of a flow field in and around building using the Lattice Boltzmann Method (LBM)

Social infrastructure engineering
Kohei NAGAI*, *Associate Prof.*



Failure of a RC beam-column joint simulated by 3D RBSM

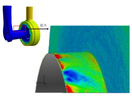
* Cooperating Member

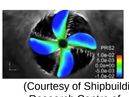
The Promoted Project

Program for Promoting Researches on the Supercomputer Fugaku: Research and development of innovative fluid-dynamics simulations for performance predictions by using Fugaku (2020-2022)

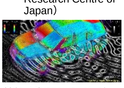
- Overview: We develop application software, by which optimal performance of HPCI (High Performance Computing Infrastructure), including supercomputer Fugaku, is got and manufacturing processes are changed
- Responsible organization: The Univ. of Tokyo; Kobe Univ.; Kyushu Univ.; Iwate Univ.; Toyohashi Univ. of Tech.; Univ. of Yamanashi; RIKEN

Leading Institute





(Courtesy of Shipbuilding Research Centre of Japan)



(Iida, Miyazawa, *et. al.*: Symposium on CFD2018)

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