# Center for Research on Innovative Simulation Software

## [Research and Development of Large-Scale Simulation used in Industry]

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

## **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 found to conduct R&D on the advanced and practical computational science simulation software utilizing hyper-large-scale simulations represented by "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

Center Vice Director **Center Director** 







YOSHIKAWA, Nobuhiro Professor

HAMBA, Fujihiro

**Professor**\*





SATO, Fumitoshi



Professor

OOKA, Ryozo MIZOGUCHI, Teruyasu



**Professor**\*

ONO, Kenji

Visiting Prof.





HASEGAWA, Yosuke

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Associate Prof.

Associate Prof.<sup>\*</sup>

\* Cooperating Member

### Introduction of the Research

## Manufacturing

#### **Design of Molecular and** Nanoscale Materials and Devices

Medical engineering and **Environmental Building Science** 











**Professor**\*





C. Kato Absolute vorticity in a centrifugal blower



F. Hamba **Contours of kinetic energy of** turbulent diffusion in rotating system. Red denotes righthanded helical motion and blue denotes left-handed helical motion



N. Yoshikawa **Developing high pressure** hydrogen tank supported by meso-scale simulation



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



F. Sato **Highest occupied molecular** orbital of insulin drawn by cloud-like model



T. Mizoguchi 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

Y. Umeno **Deformation of Polycarbonate** by Coarse-Grained Particle **Model Simulation** 

#### Large-Scale Data Analysis





M. Oshima

Leading Institute

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



R. Ooka Analyses of flowfield in and around building using Lattice Boltzmann Method



K. Nagai Failure of RC beam-column joint by RBSM

## Example of Major National Project being Promoted by CISS

#### **Program for Promoting Researches on the Supercomputer Fugaku:**

Research and development of innovative fluid-dynamics simulations for performance predictions by using Fugaku (2020-2022)

Computing Infrastructure), including supercomputer Fugaku, is got and manufacturing processes





