

Center for Computational Science

Graduate School of Engineering, Nagoya University



Recreating hierarchical and super-multidimensional nature

Outline and Objectives of the Center

The objectives of the Center for Computational Science are to establish a more sophisticated environment for education and research related to computational science, and to form a center, where young researchers and engineers can be nurtured, each field of computational science can be advanced, and new fields can also be developed, by promoting collaboration and cooperation with education, research and technological groups from within and outside the university, which are involved with utilization of computers.

We aim to form a center where education and research in the computational science fields, which utilize the computer, an indispensable tool for the development of science and technology in the 21st century, will be conducted through collaboration and cooperation with various organizations and institutions both within and outside the university. The center will achieve promotion of education for outstanding young researchers and engineers in the computational science and engineering fields, development of research in computational science fields, construction of the databases based on large-scale computation, international collaboration, and collaboration with corporations.

Tasks of the Center

We will aim to enhance the educational and research environment through cooperation among the core sections and the collaborative sections.

◆ Collaborations within the university

The following lectures and seminars are scheduled to be held in 2009.

• Large-scale Parallel Computing

• Frontiers of Computational Science Lecture

• Topics in Frontiers of Computational Science

• Co-sponsoring Computational Science Salon

• Workshop for applied software

• Guidance for attending lectures related to computational science

◆ International collaboration and collaboration with organizations outside the university

We will promote the nurturing of young researchers and engineers who will play an important role in the development of the next generation supercomputer by collaborating with organizations outside the university. Furthermore, we will hold "International Seminars and Workshops" by conducting international joint research and inviting international researchers, and will promote concluding agreements with overseas universities in order to make it possible for us to accept researchers from foreign countries who will be able to stay long-term.

Organization

The center has established seven sections; the Database Section, High-performance Computation Section, Fluid Dynamics Section, Solid State Physics Section, Biological Science Section, Algorithm Section, and Computational Chemistry Section. Of these, the Database Section and High-performance Computation Section are the core sections of the center, and the other five sections are collaborative sections, in which a part of the faculty from the Graduate School of Engineering and from other graduate courses cooperates.

Director Masaki Sasai

Core Sections

Database Section

Assoc. Prof. T. Ishihara
Assist. Prof. N. Okamoto

This section aims to construct and utilize a database for large-scale calculations and to build an infrastructure to support that database.

High-performance Computation Section

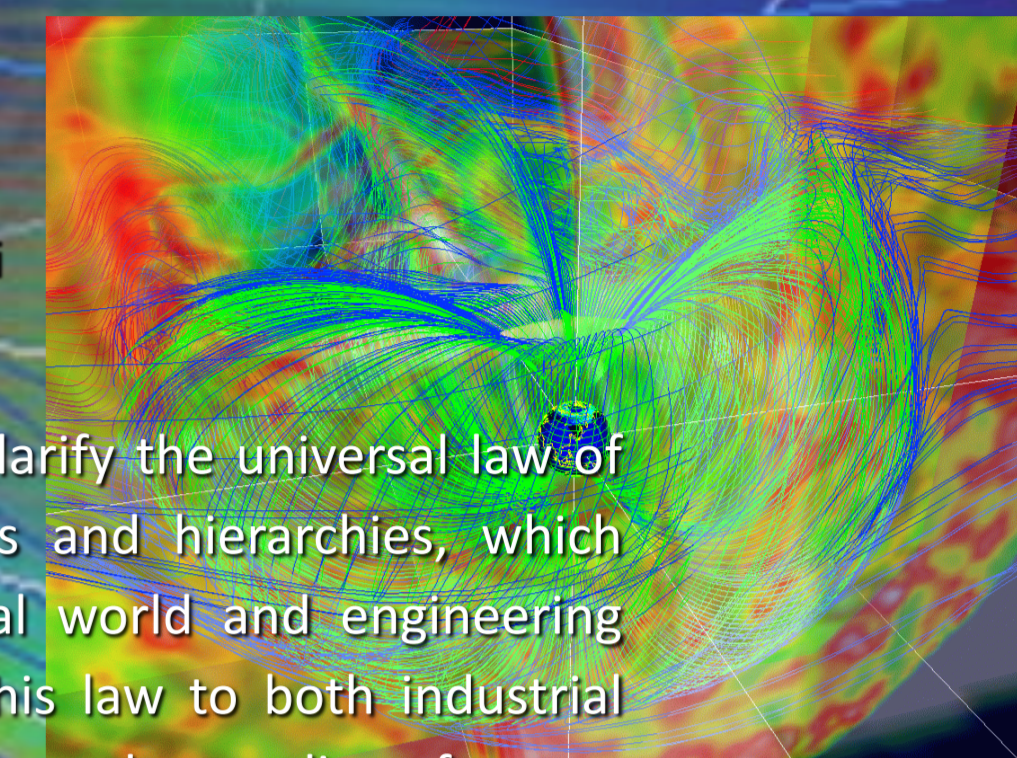
Contract Assoc. Prof. N. Yoshii

This section aims to develop a large scale and high-performance computation method, which can be utilized in the development of the next generation super computer.

Fluid Dynamics Section

Prof. Y. Nakamura
Prof. K. Ishii
Prof. K. Kusano
Assoc. Prof. K. Tsuboki

This section aims to clarify the universal law of flow at various scales and hierarchies, which appears in the natural world and engineering fields, and to apply this law to both industrial technology and a better understanding of nature.

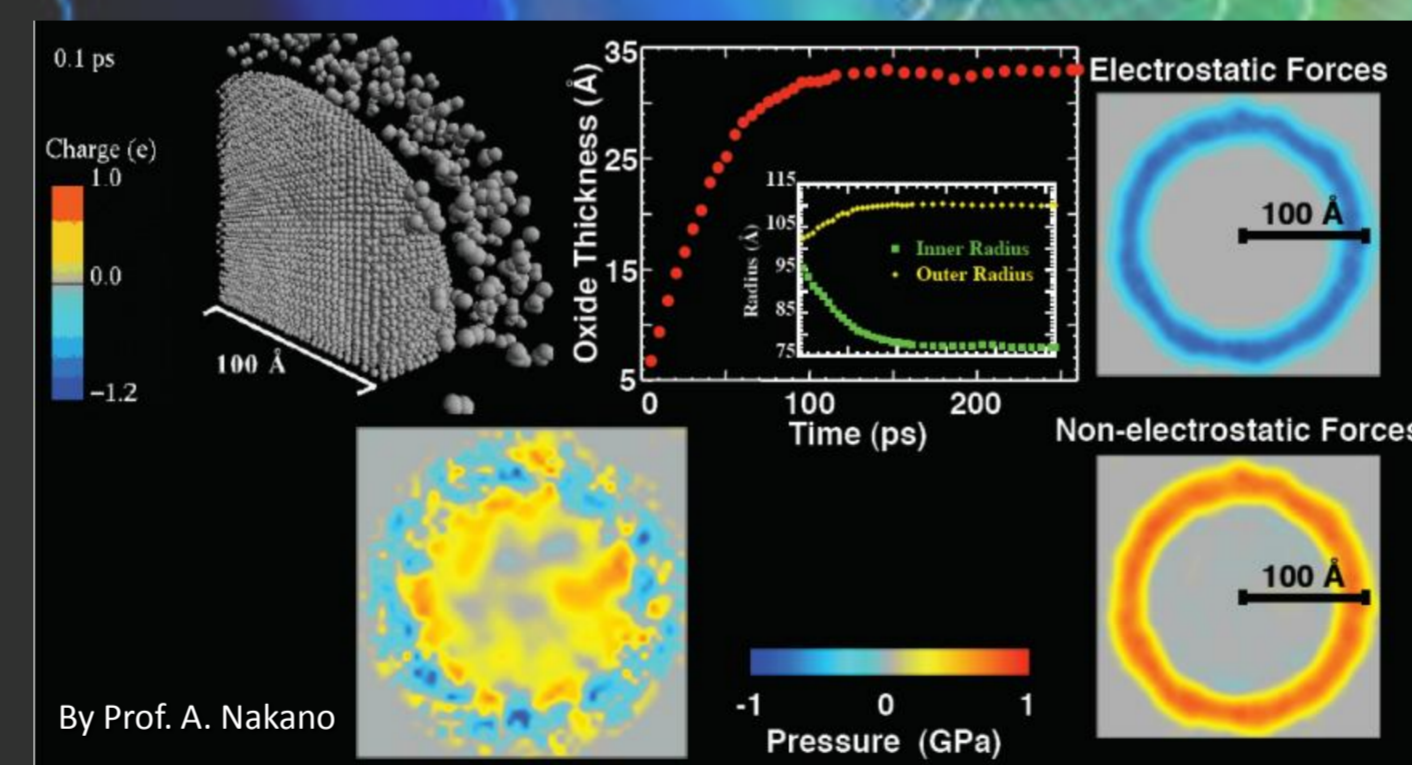


Collaborative Sections

Solid State Physics Section

Prof. Y. Tanaka
Prof. H. Kontani

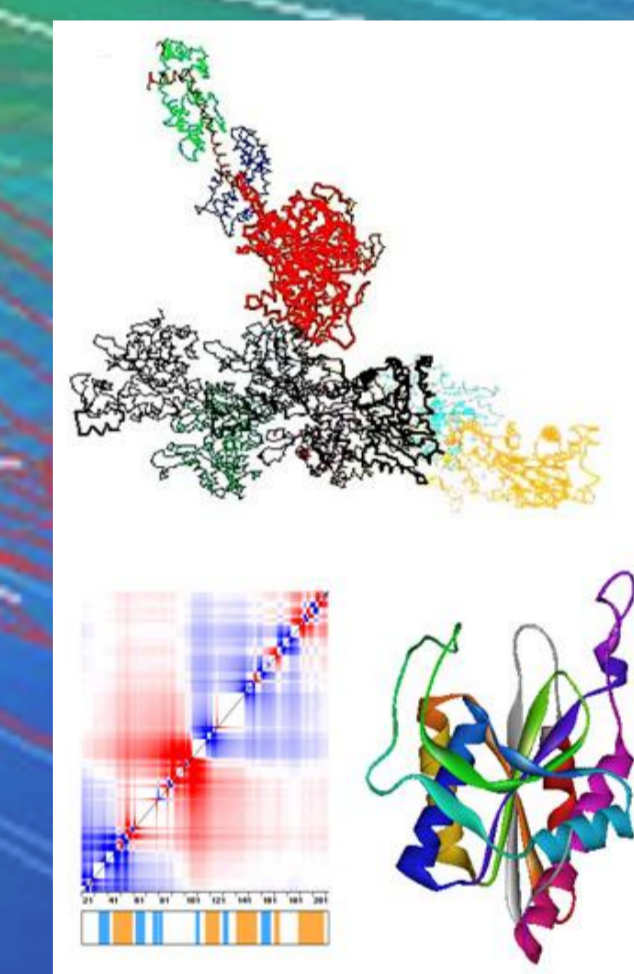
By clarifying the behavior of the electron, which determines the properties of solid matter, through analyses and numerical methods, this section aims to achieve a uniform understanding of physical properties, as well as to predict novel phenomenon, and to apply this knowledge in the design of devices.



Biological Science Section

Prof. M. Sasai
Prof. Y. Okamoto
Prof. M. Ohta
Assoc. Prof. T. Wa
Lecturer T. Terada

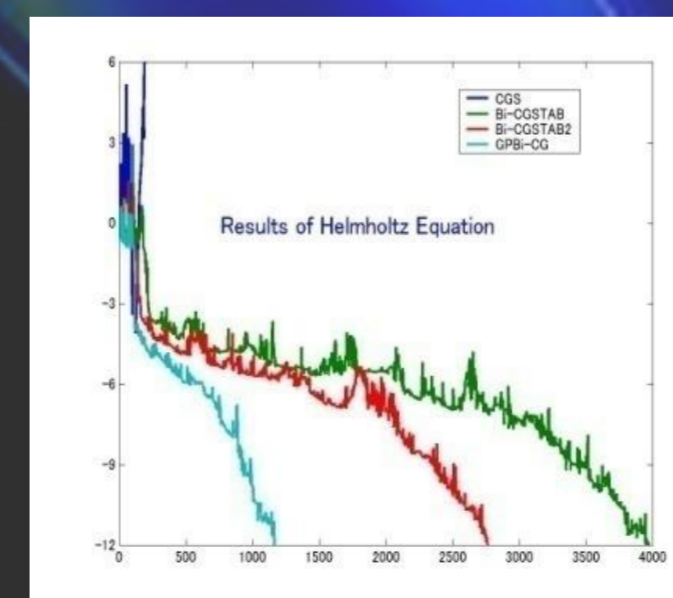
This section aims to study hierarchical mechanisms in self-organization of biological systems through computational analyses of dynamics and functions of bio-molecules and their complexes, and through prediction of structure and function of proteins.



Algorithm Section

Prof. S.-L. Zhang
Prof. T. Furuhashi

This section conducts the integrated development of a high-speed algorithm and the visualization of multidimensional data, aiming at solving the various mathematical problems that appear in super-large scale/multi-degrees of freedom computations.



Computational Chemistry Section

Prof. S. Okazaki
Prof. N. Koga
Prof. M. Nagaoka

Using non-empirical quantum chemistry and molecular dynamics, this section aims to clarify the chemical reactions and dynamics of molecular systems, and to promote novel molecular synthesis, as well as researches that will lead to better understanding of biological phenomena.

