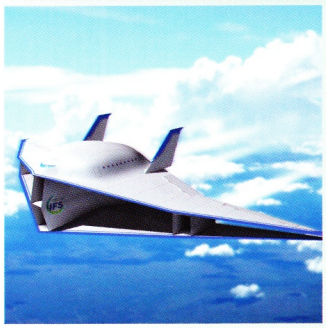
Evolving research system

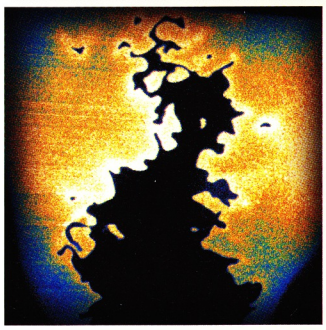
[Aerospace Cluster] Professor Shigeru Obayashi, Head of the Aerospace Cluster



Aiming for aerospace system development with Japanese technology

The purpose of the Aerospace Cluster is to infuse cutting edge achievements in fluid science research into the development of aerospace systems and, ultimately, to play a part in the development of airplanes and spacecrafts with technology crafted in Japan. In the field of spacecrafts, the H-II rocket was developed using all-Japanese technology. However, it must be recognized that we relied on a space shuttle for crewed space travel. In the field of airplanes, recently a japan's company participated in the manufacturing of business jets with small passenger capacities, the other company developed regional jet with a 70-90 passenger capacity. The Institute of Fluid Science was collaborating in design and testing for the regional jet. Exciting possibilities are escalating for the manufacturing of Japanese aircrafts. I am currently conducting research and development on the supersonic aircraft "Misora," which flies at mach 1.8. The Misora uses biplane wings in an attempt to reduce the noise generated by the sonic boom, which is held to be the largest problem in traveling at supersonic speeds. Full mobilization of cutting edge technology such as CFD, which is the pride of the Institute of Fluid Science, and enlistment of assistance from industry related government offices as well as private sector industry players to make the Misora a reality is the chief goal of this cluster.

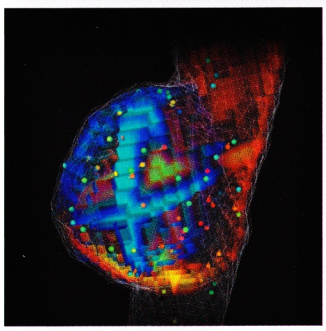
[Energy Cluster] Professor Hideaki Kobayashi, Head of the Energy Cluster



Combustion, zero emissions, and nuclear safety

Emissions from combustion contain carbon dioxide, and it is believed that one fourth of the carbon dioxide existent in the atmosphere of our earth at present is emitted by humans. This carbon dioxide, emitted in massive amounts, is linked to global warming, which is one of the most devastating problems we face today. In the Energy Cluster, the Zero Emissions Project aims to ergonomically contribute to solutions for the problem of global warming. Increasing the thermal efficiency of industrial combustion furnaces allows significant reductions in the amount of carbon dioxide emitted. And if an efficient fuel cell is developed, the carbon dioxide originating from automobiles can also be reduced significantly. This would also allow carbon dioxide to be collected, solidified, and buried in the ground. The Zero Emissions Project takes on the problem of reducing burdens on the environment. Meanwhile, nuclear power generation stepped onto the stage as a source of energy in the second half of the 20th century. Though nuclear power generation does not give off great amounts of carbon dioxide, it does suffer from the issue of safety. The Nuclear Safety Project, an endeavor which the Energy Cluster is engaged in, is developing highly efficient sensors to detect pipe cracks and also working towards the development of new technology that can detect the warning signs for future cracks.

[Life Science Cluster] Professor Takehiko Sato, Head of the Life Science Cluster



Approaching health and medical treatment from a fluid science perspective

In the Life Science Cluster, we have been engaged in researching blood flow using cutting edge methods in fluid engineering. Using this investigation into blood flow phenomena for health maintenance and illness treatment is the goal of the Life Science Cluster. Currently, we are maintaining two projects. The Health Simulation and Management Project is geared towards aiming computational models that make expert use of supercomputer at simulation (prediction) and control (treatment and prevention) of the health state and innovating medical treatment technology. We look forward to future contributions in the prevention and treatment of diseases like cerebral infarction and heart disease which share a deep relationship with the blood. The Construction of Biological Function Systems Project conducts research in the cross disciplinary field known as biomimetics. This is research that bases technological development on the various functions of the body. We are funneling our achievements in biological research back into the realm of mechanical engineering with the construction of new fluid machinery systems.

[Nano-Micro Cluster] Professor Seiji Samukawa, Head of the Nano-Micro Cluster

For making Japan again a semiconductor nation

The Nano-Micro Cluster engages in fluid research at the nano and micro level, with focal points including plasma dynamics, molecular heat dynamics, non-equilibrium molecular gas dynamics, and nano interfacial dynamics. Linking the achievements of research in these areas to the development of industrial technology is the role of this cluster. The fields of industry we hope to benefit are the semiconductor manufacturing industry and industries related to MEMS/NEMS. In the semiconductor manufacturing industry, it was once the case that the US handled CPUs and Japan handled memory. Japanese corporations took a global leadership position in the construction of semiconductor memory. However, initiative in the construction of semiconductor memory is now in the hands of Korean and Taiwanese manufacturers. Using the achievements of our research in semiconductor manufacturing and reestablishing Japan as a semiconductor nation is the most important goal of this cluster.The other goal of this cluster is contribution to the MEMS/NEMS manufacturing industry, which is expected to see rapid growth in the near future. MEMS/NEMS (Nano/Micro Electro Mechanical Systems) are devices with mechanical structures that are micrometer and nanometer sized, made using mostly semiconductor manufacturing technology. The cutting edge research being conducted at the Institute of Fluid Science makes it possible to contribute significantly to the development of this cutting edge industry.