

KAWAGUCHI - MUTO LAB.

Research and Development of Spatial Structure

Department of Human and Society



Spatial Structure
Department of Architecture, Graduate School of Engineering

http://space.iis.u-tokyo.ac.jp/main_j.html

Research & Development of Spatial Structure

Kawaguchi- MutoLab. performs research and development of various 3-dimensional spatial structures ,which have advantageous features to conventional planar frame structures. Spatial structural systems are usually highly efficient with light-weight and high rigidity. We are tackling a wide range of research topics on the theme of "spatial structure" including the investigation of damage on the ceilings in large-space architecture and huge expandable reflector in space.



World 1st Typical Tensegrity frame as Building Skelton

The World 1st typical tensegrity frames was constructed as building skeletons in Chiba in 2001. "White Rhino II" is the successor constructed in Kashiwa Campus in 2017. The pentagonal and tower-type tensegrity supports the membrane roof, and at the same time make us feel the sense of "floating the bars in the air". (Collaboration with Imai lab. in IIS)



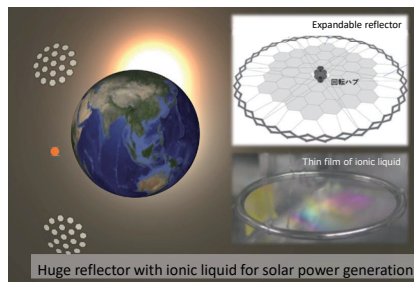
Architecture with Living-tree structural frames

Living creatures has unique characteristics such as "growth", "self-healing", "transport of the material", and might lives longer than the lifespan of industrial material. We proceed the project to make the structural frame with living trees, and aims to architecture with less labor, lower environmental impact, longer period of use, with the help of the researchers in plant-physiology and agriculture



Increase safety of users in large-Span Buildings using human tolerance

The suspended ceiling always has a risk of falling. In particular, the large-span architecture has large risk due to large area and high position of ceiling and heavy weight of lighting equipment, which injured the users in the buildings in some cases. Last year we conducted the survey on the ceiling damage in Noto-Peninsula EQ 2024 & Bungo-Strait EQ.



Huge reflector with ionic liquid for solar power generation

A space photovoltaic power generation system enables large-capacity, stable, and eco-friendly power supply, but it requires 3 km-diameter huge reflector. For significant weight saving and redundancy, we try to make reflective mirror surface by stretching a thin film ($t \sim 400$ nm) with an ionic liquid, which keeps in low pressure 10^{-4} Pa & low temperature -80°C .

