

TAKEMOTO LAB.

Optimal Design of Hydrogen/Cryogenic Tank by AI



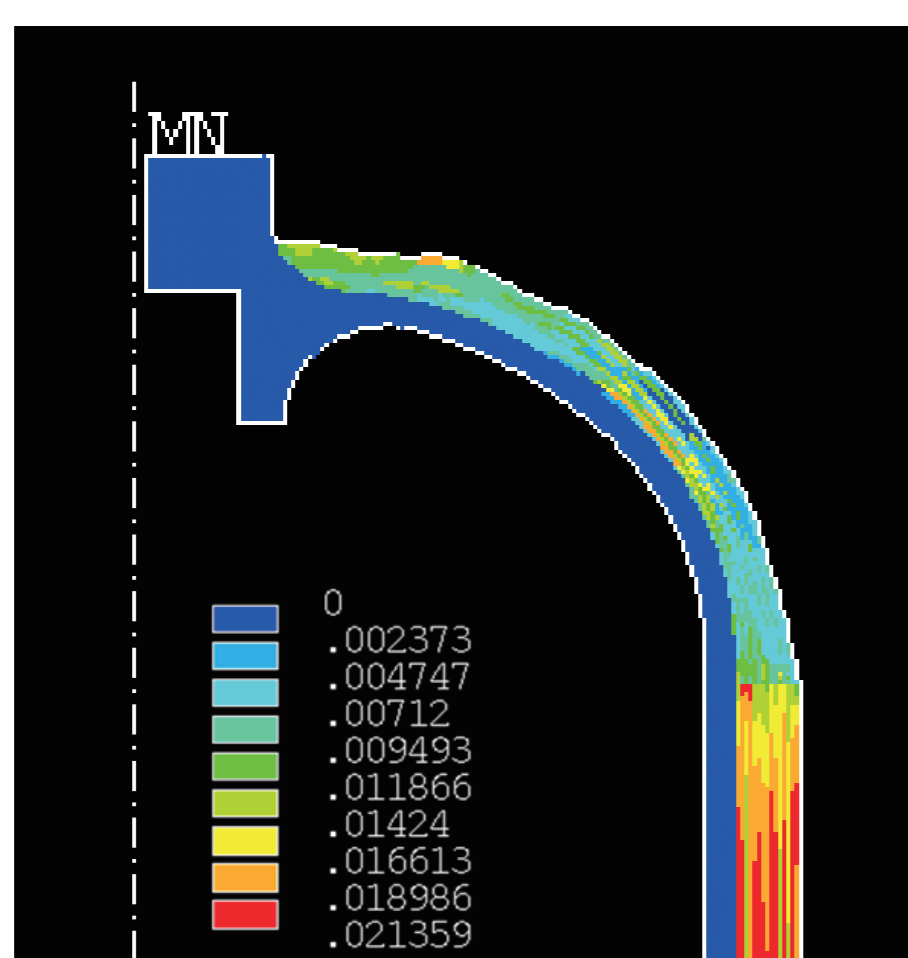
Department of Fundamental Engineering

AI Design Engineering

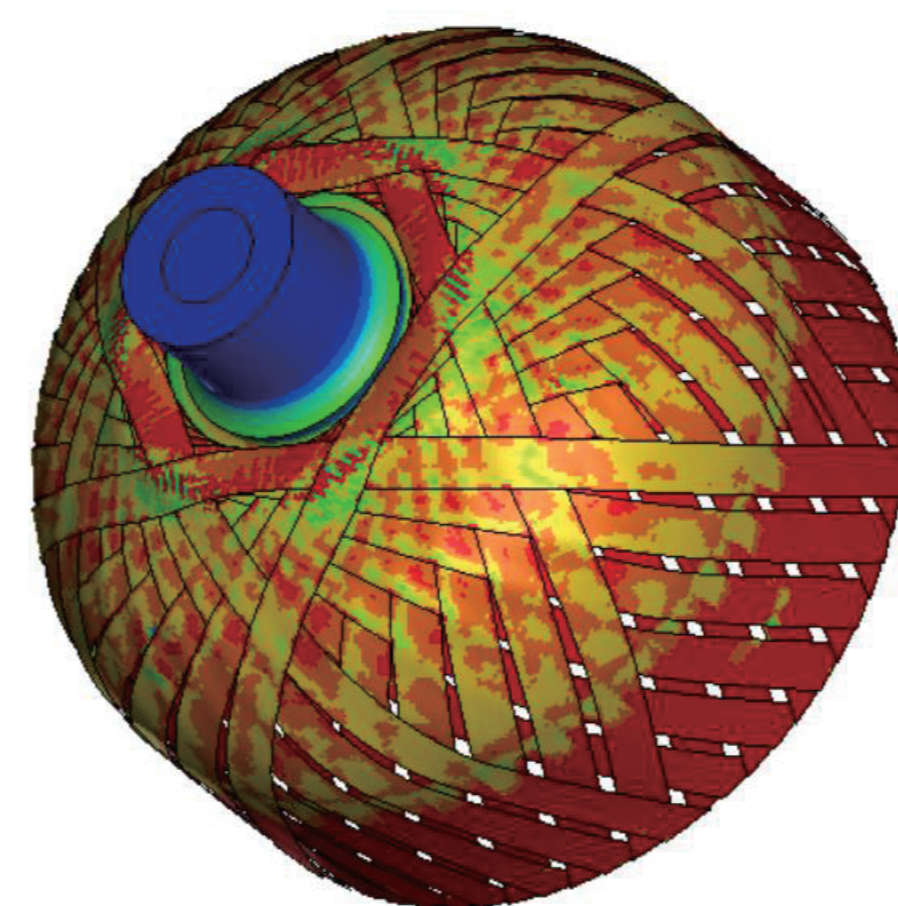
<http://www.young.iis.u-tokyo.ac.jp/>

We are conducting research and development into a system that can quickly and easily optimize the design of innovative carbon fiber reinforced plastic (CFRP) tanks, which are the lightest and most affordable, such as high-pressure hydrogen storage tanks essential for a hydrogen society aiming for a decarbonized society, and ultra-lightweight liquid fuel tanks that will enable mass transportation in the space transportation era.

- Two-scale analysis combining 3D mesoscale model simulations that reproduce the complex fracture phenomena of CFRP and 2D macroscale model simulations that enable high-precision prediction and high-speed calculation of tank.
- Development of an optimal tank design system that uses a genetic algorithm to rationally search for the shortest possible solution.
- Creation of innovative container structures using an optimal tank design system.



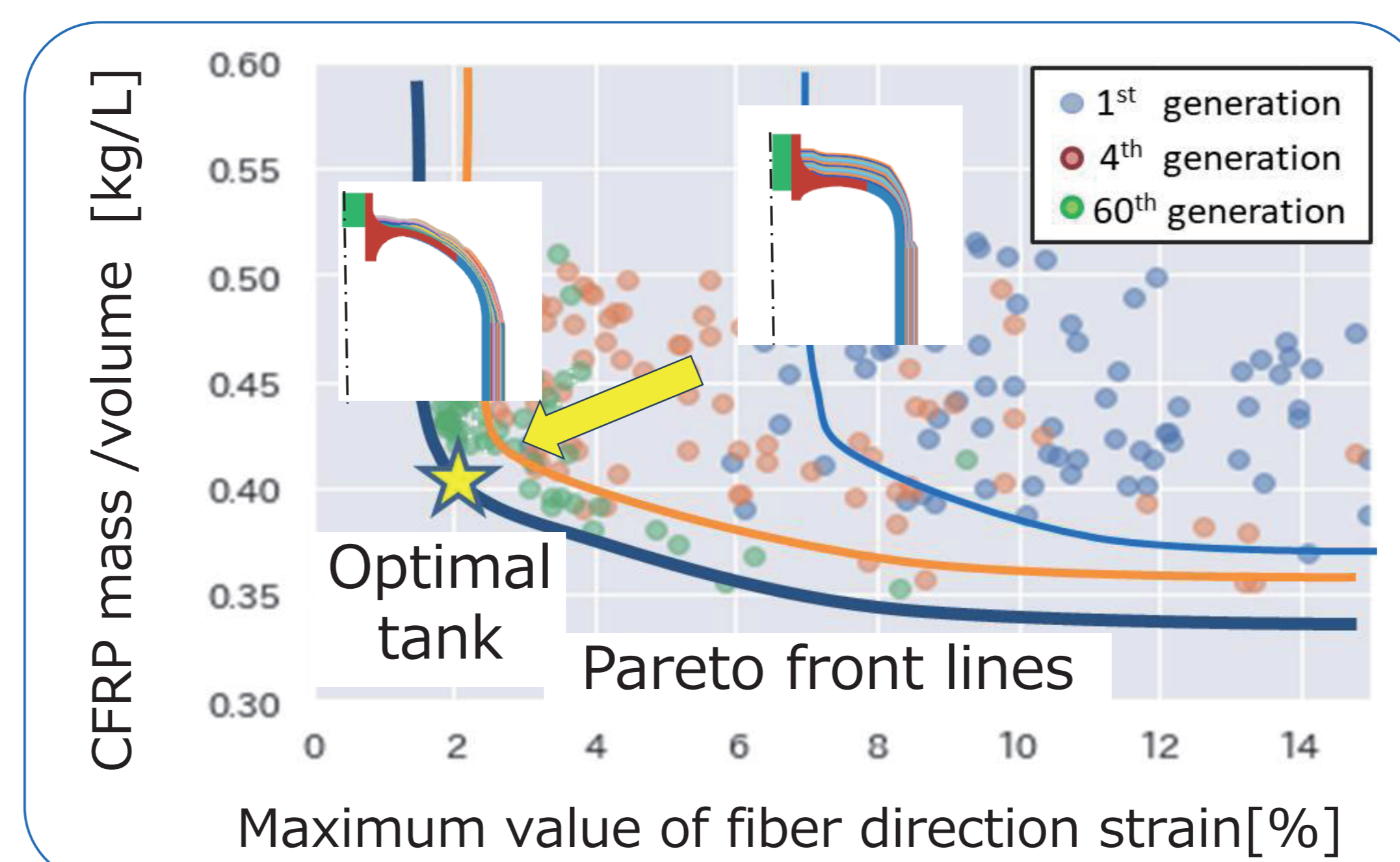
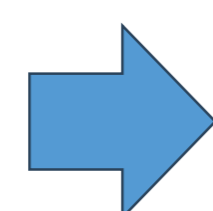
2D tank macroscale model simulation



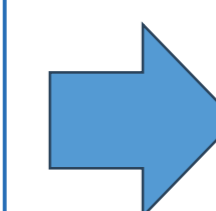
3D tank mesoscale model simulation



Validation of simulation by tank burst test



Optimal tank design system*



*Contract development of NEDO's "Common Problem-Solving Industry-Academia-Government Collaborative Research and Development Project for Rapidly Expanding Use of Fuel Cells, etc."