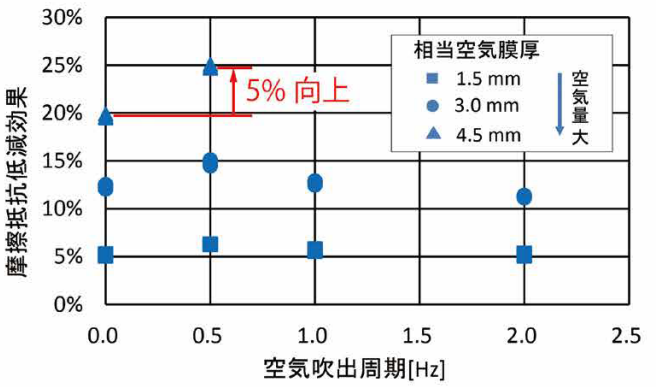
GHG Reduction Project Team

This project team conducts R & D on technologies for reducing hull resistance and alternative fuel use, as well as estimation of total GHG emissions based on demand forecasts for marine logistics, aiming to contribute to the IMO GHG reduction target for international shipping and to achieve carbon neutrality for domestic vessels under the Paris Agreement.

GHG reduction technology from a hydrodynamic viewpoint

By conducting tank tests of the air-lubrication method using a 36m-long model ship that simulates a full-scale ship's bottom, we confirmed that the cyclic air-blowing method, by which the air blows periodically over the ship's bottom, is 5% more effective in reducing frictional drag than the conventional continuous air-blowing method.

36m-long model experiment (400m tank)

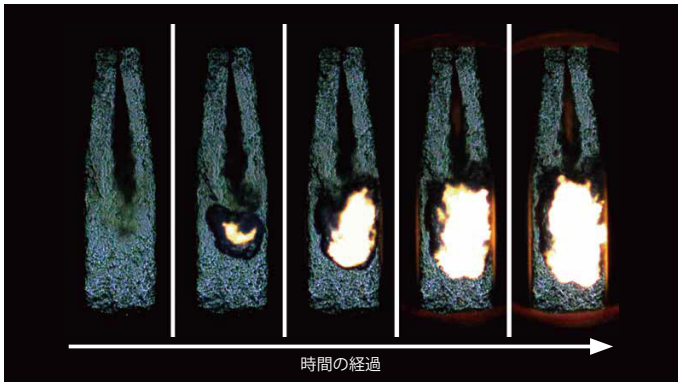


Frictional drag reduction effect (ship speed 8m/s)

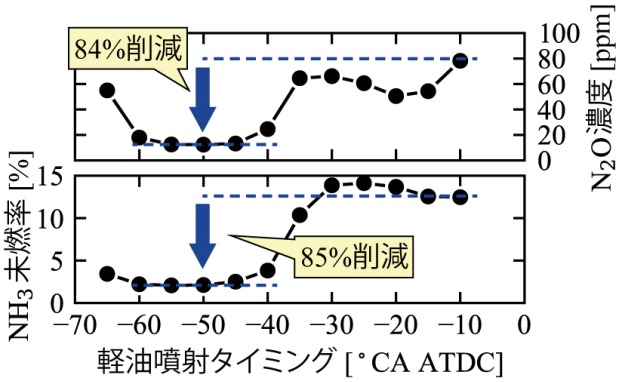
[Plots at 0.0 Hz indicate continuous blowing, and others indicate cyclic blowing.]

GHG reduction technologies from viewpoints of alternative fuels and engine efficiency

We are conducting R & D to replace conventional heavy fuel oil fuels with carbon-free fuels such as hydrogen and ammonia and carbon-neutral fuels such as biofuels for use in ship power systems. We are conducting hydrogen-mixing experiments on actual gas engines and ammonia-mixing experiments on the intake air of experimental diesel engines.



Visualization of combustion conditions inside the engine (petroleum fuel)



Test results from ammonia-mixed combustion engine