

Actuator Location Optimization for Large Degree-of-Freedom Fields

Project manager

Taku Nonomura

Professor,
 Graduate School of Engineering,
 Nagoya University



leader's institution

Nagoya University

R&D institutions

Nagoya University,
 Tohoku University

Summary of the project

Towards weather control, it is necessary to solve the bottleneck of unknown actuator locations to maximize weather control effectiveness. In this project, we will organize, develop, and evaluate location position optimization methods. We will show that the actuator location obtained by the method developed in this project improves the control effectiveness by numerical simulation.

Milestone by the end of project (year 2024)

We are going to significantly improve the control effectiveness by the actuators (control input) at the location optimized by the proposed method. For this purpose, we develop and evaluate actuator (control input) location optimization methods.

R&D theme structure of the project

Actuator Location Optimization for Large Degree-of-Freedom Fields

**Theme 2
 Mathematical Problem Formulation for Actuator Location Optimization**

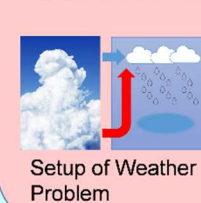
$$PA + A^T P - PBH^T R^{-1} H B^T P + Q = 0$$

$$W_c := \int_0^{\infty} e^{A^* t} B H^T H B^T e^{A^* t} dt$$

Consideration on mathematical Problem for optimization of actuator



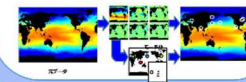
**Theme 3
 Construction of Evaluation Method for Optimized Actuator Placement on Weather Simulator**



**Theme 1
 Development of Actuator Location Optimization Algorithm and Its Application to Modeling and Weather Problems**

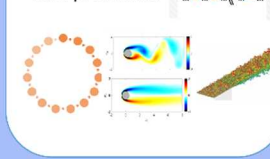
Development of Actuator Location Optimization Algorithm

- Realize actuator location optimizing algorithm by taking advantage of sensor location optimization technique



Development of Modeling Problems and Evaluation of Algorithm

- Test problems



Efficiency improvement through optimization of heat source input locations

Application · Output
 Feedback to sensor location optimization

Efficiency improvement through optimization of vapor input locations