

HASEGAWA LAB.

[Prediction and control of interfacial transport]

Centre for Research on Innovative Simulation Software

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

Interfacial Transport Engineering

Dept. Mech. Eng.

Prediction and control of interfacial transport

Inverse problems in thermo-fluids systems

Toward better environmental prediction and efficient energy utilization, we investigate turbulent flows and associated transport phenomena. More specifically, we are developing novel strategies for integrating limited noisy sensing data into numerical simulation in order to reconstruct three-dimensional structures of flow and associated thermal and concentration fields. In addition, by applying optimal control theory, we aim to deterministically optimize various energy devices without relying on investigators' subjective insight.

Optimal control of wall turbulence for drag reduction

Development of novel control strategies for enhancing convective heat transfer

Deterministic optimization of complex 3D structure for energy devices

Estimation of flow and associated heat/concentration fields based on limited sensing information with noise

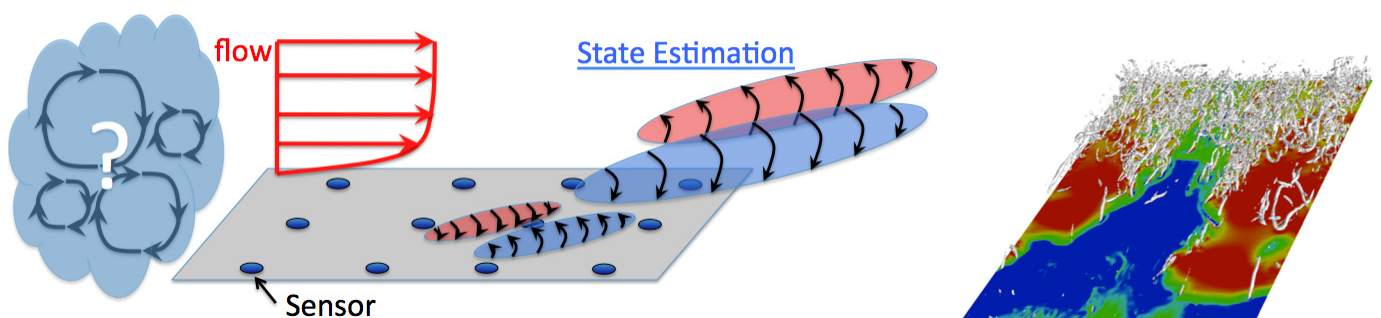


Fig 1. Estimation of flow and associated scalar fields based on sensing data

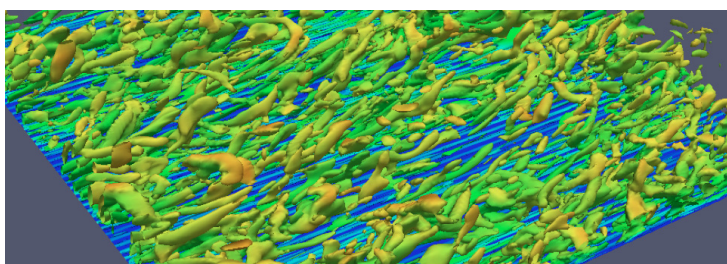


Fig 2. Turbulent Drag reduction at superhydrophobic surfaces

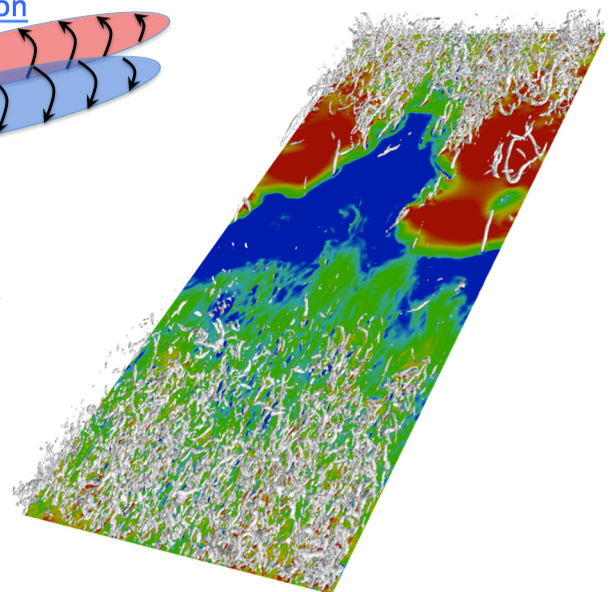


Fig3. Optimal control of wall turbulence for simultaneous achievement of drag reduction and heat transfer enhancement