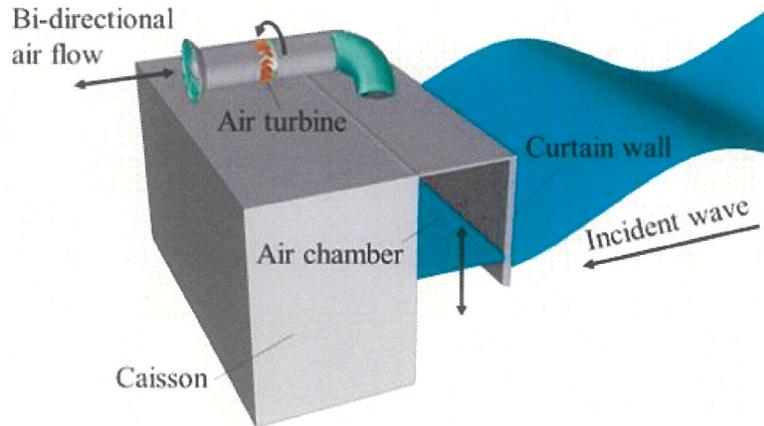


Wave Energy Group: Yasutaka IMAI (imaiy@cc.saga-u.ac.jp)

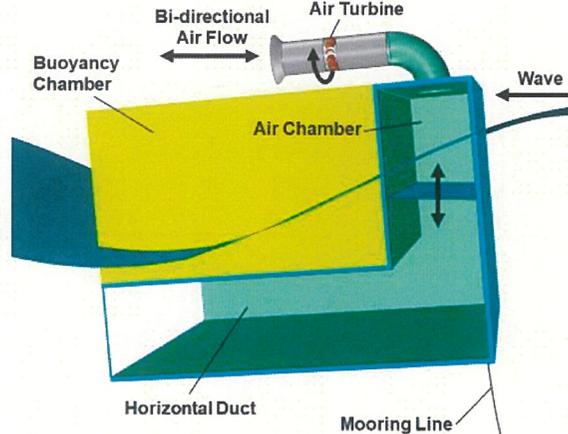
*Development of wave energy converters to achieve 35JPY/kWh (0.23USD/kWh)

*Oscillating Water Column (OWC)

Bottom-fixed OWC



floating OWC



Advantage:

- *It is highly resistant to typhoons because wave energy is converted into air energy,
- *There is little risk of water leakage because the generator is located in the air.

2025-2026

Concept(TRL1-3) 1:50

- *Experiment/simulation in regular and irregular waves
- *Without Power Take-Off
- *body shape to maximize energy conversion

2027-2028

Design(TRL4) 1:10

- *Experiment/simulation in regular and irregular waves
- *With Power Take-Off
- *Large PTO

2029-2030

Validation(TRL5-6) 1:4

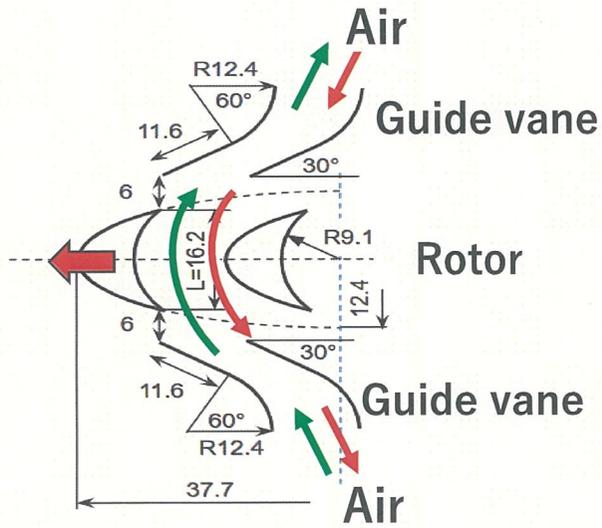
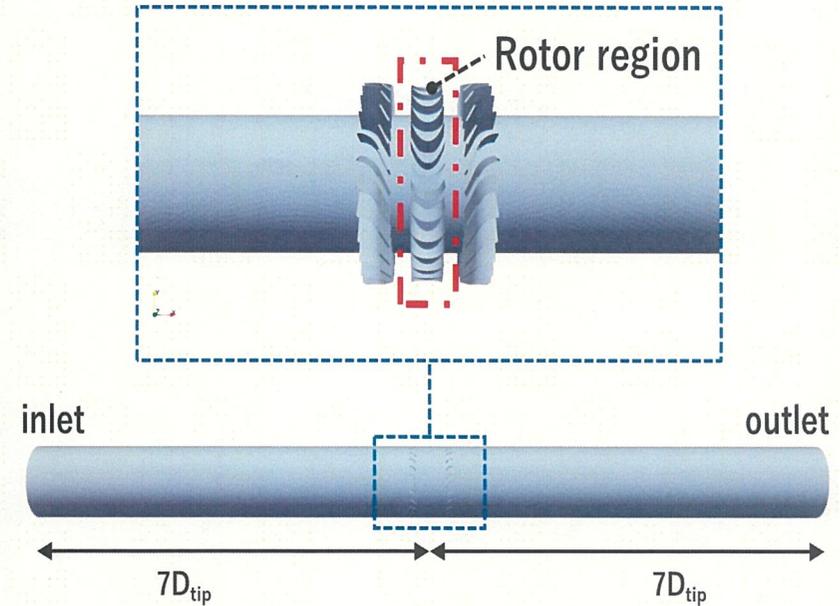
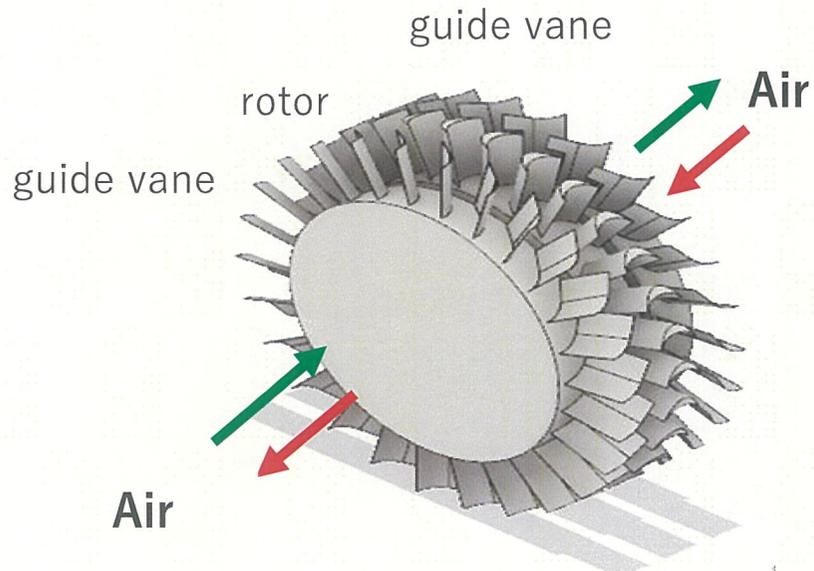
- *Demonstration
- *Calculation of power conversion from irregular waves to grid
- *Cost estimation

2031-2032

Implementation (TRL7-8) 1:1

- *Demonstration
- *Calculation of power conversion from irregular waves to grid
- *O&M
- *Cost estimation

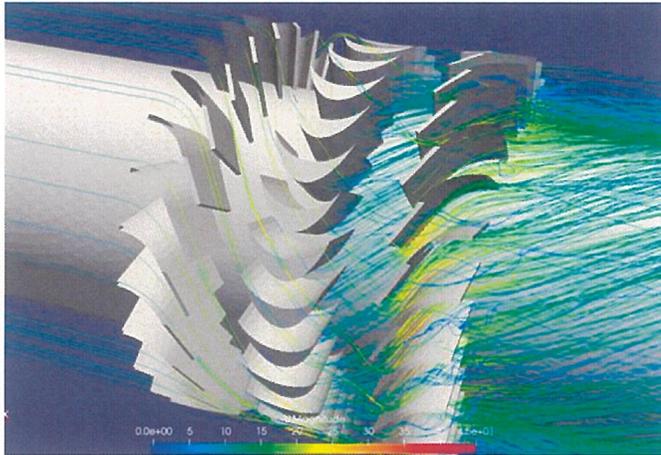
Topic 1: Numerical simulation of impulse turbine



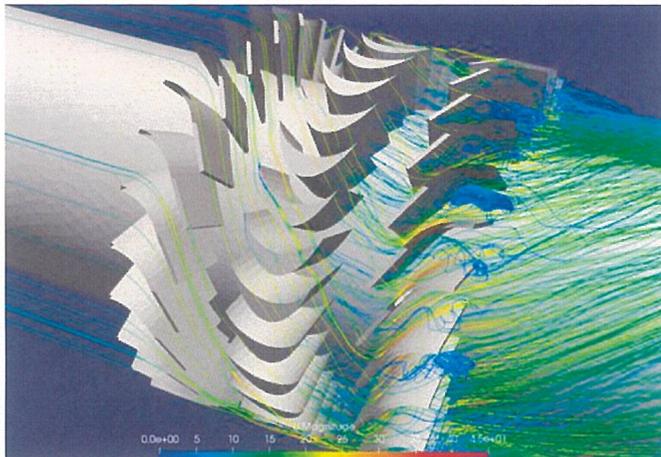
rotor rotation model	Multiple Reference Frame
puressure-velocity coupling	SIMPLE method
inlet velocity	8.71[m/s]
rotation speed	300~1300[rpm]
cell number	1.48million
time step	1e-5[s]

Topic 1: Numerical simulation of impulse turbine

One way flow

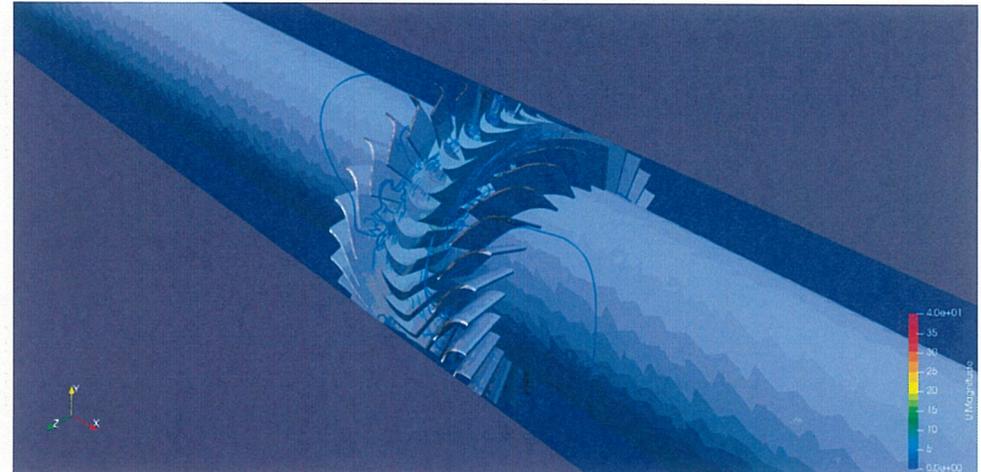


700rpm

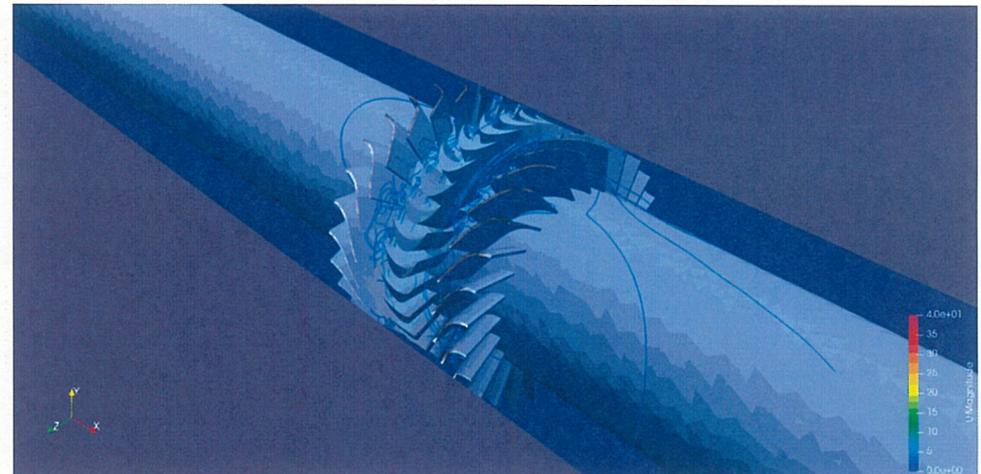


1300rpm

Two way flow

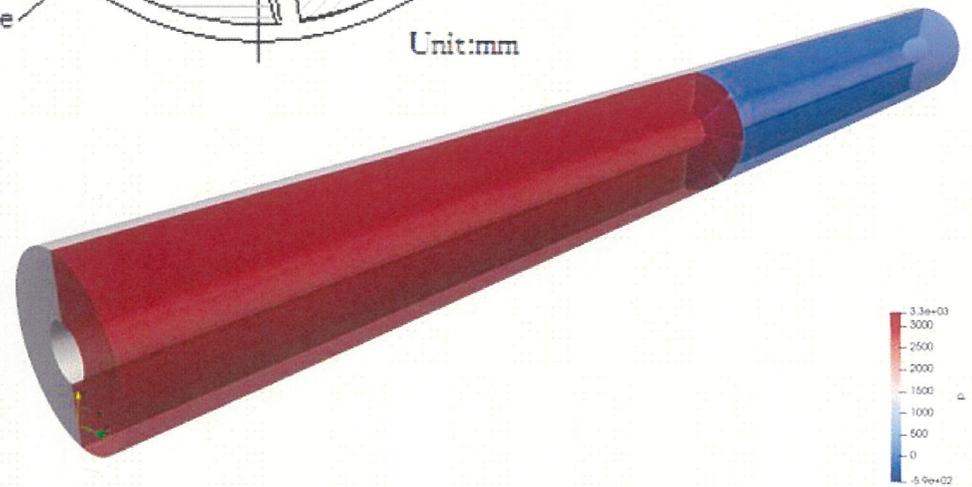
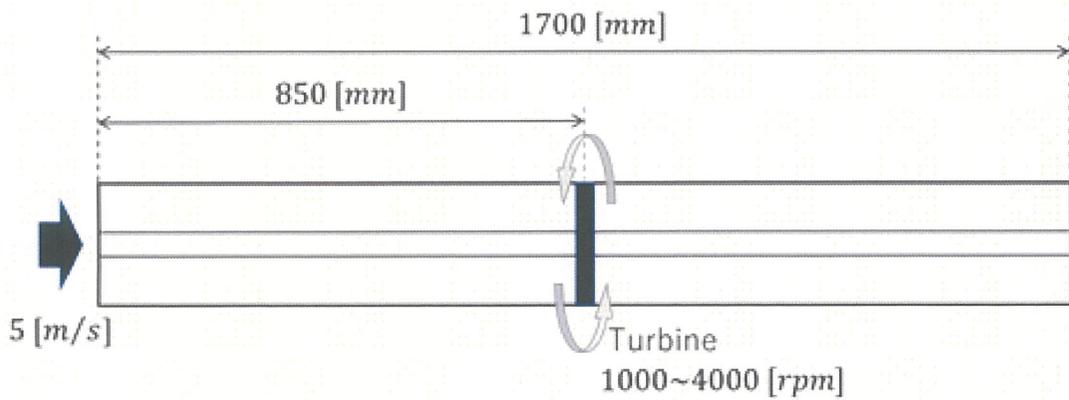
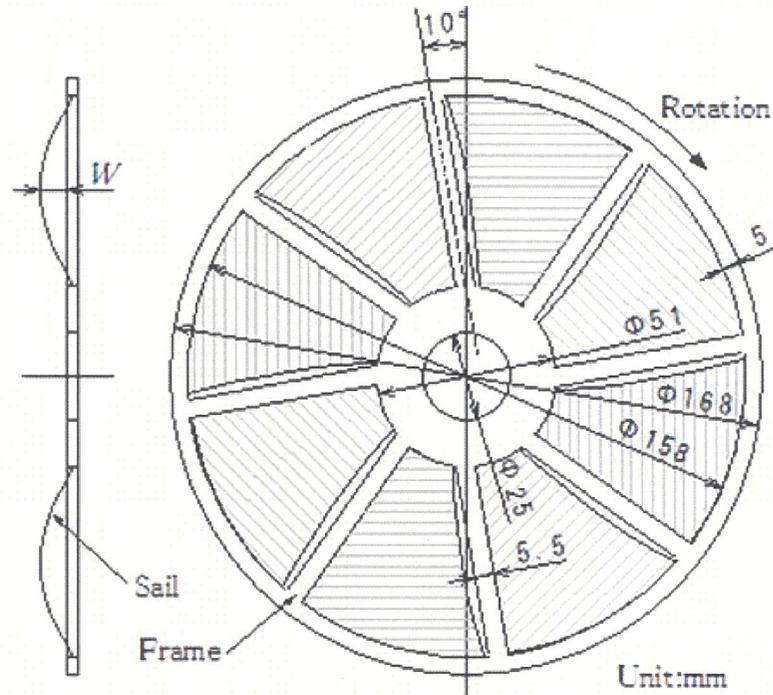
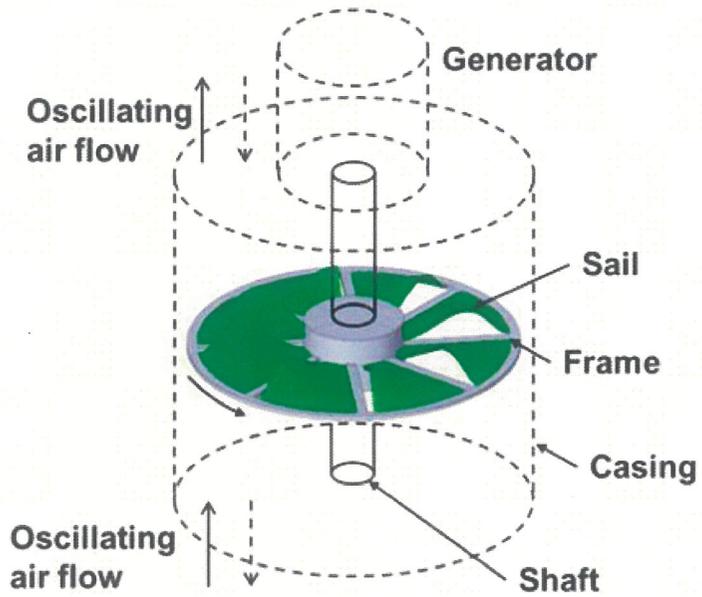


(a) period=0.5[s]

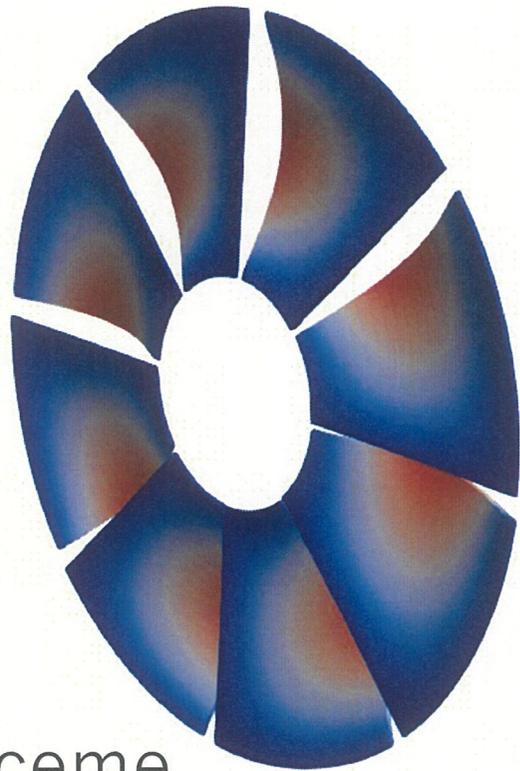


(b) period=2.0[s]

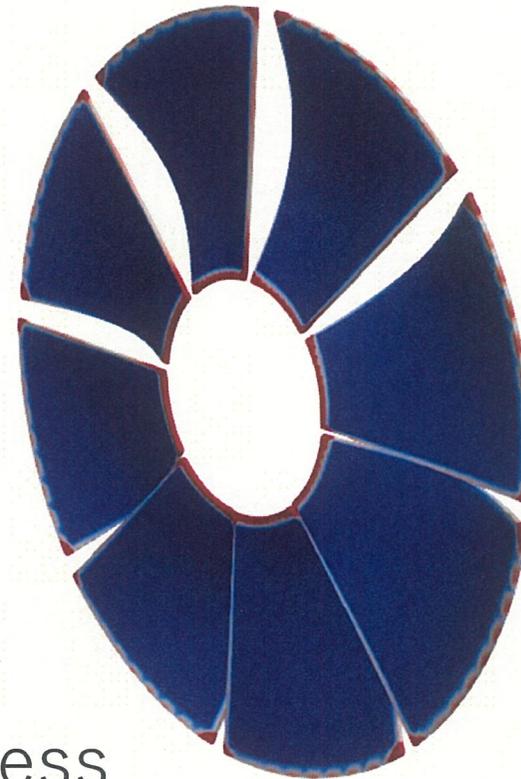
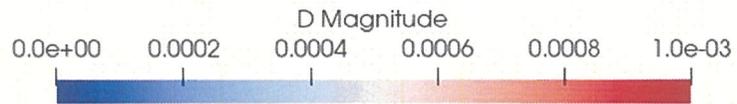
Topic 2
 Numerical simulation of sail turbine



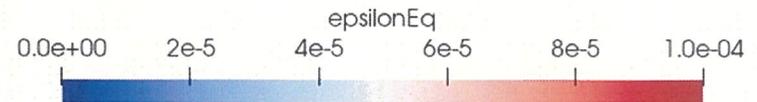
Topic 2
Numerical simulation of sail turbine



Displacement



Stress



Topic 3 Sea trial of a floating OWC

