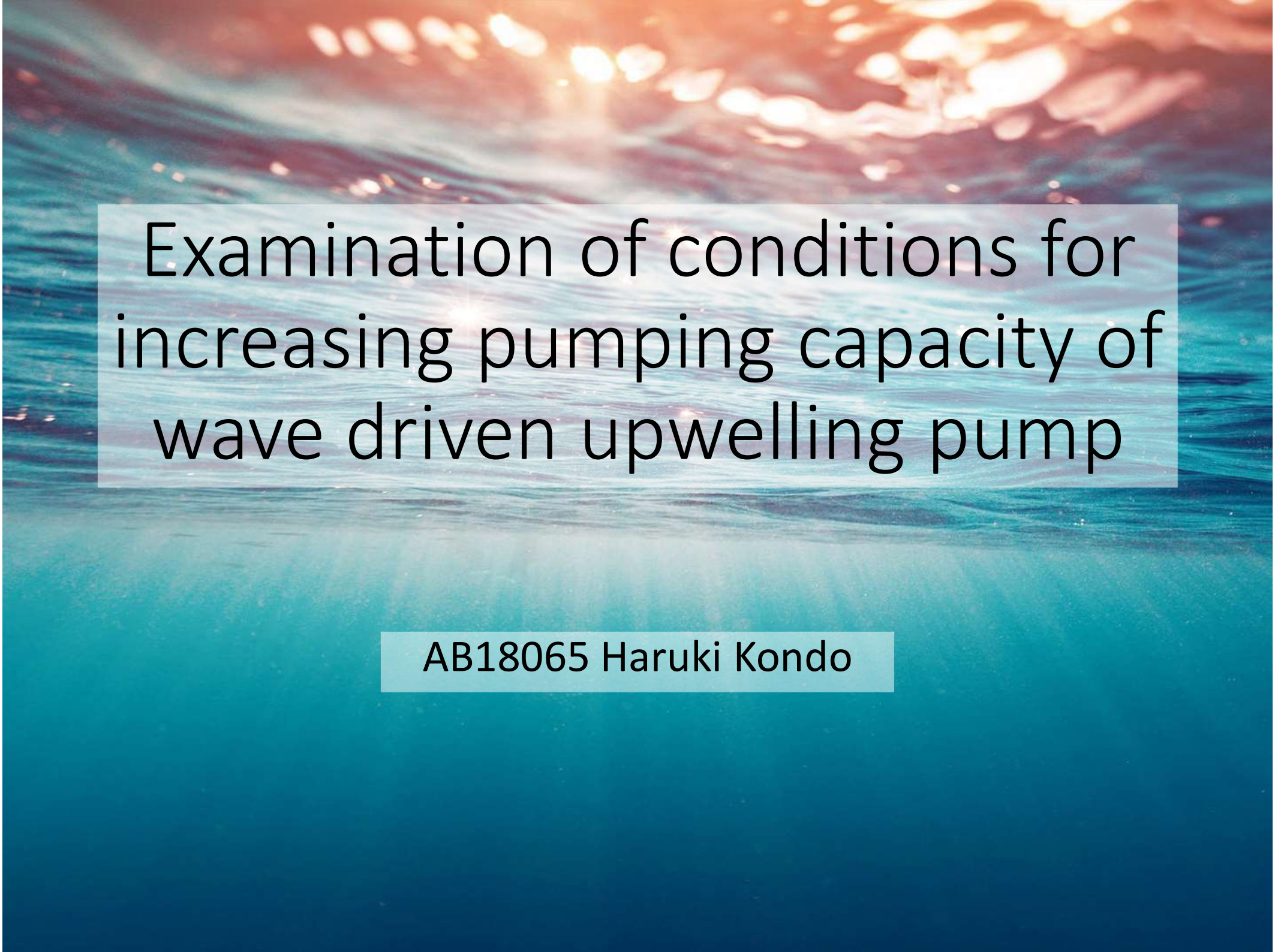
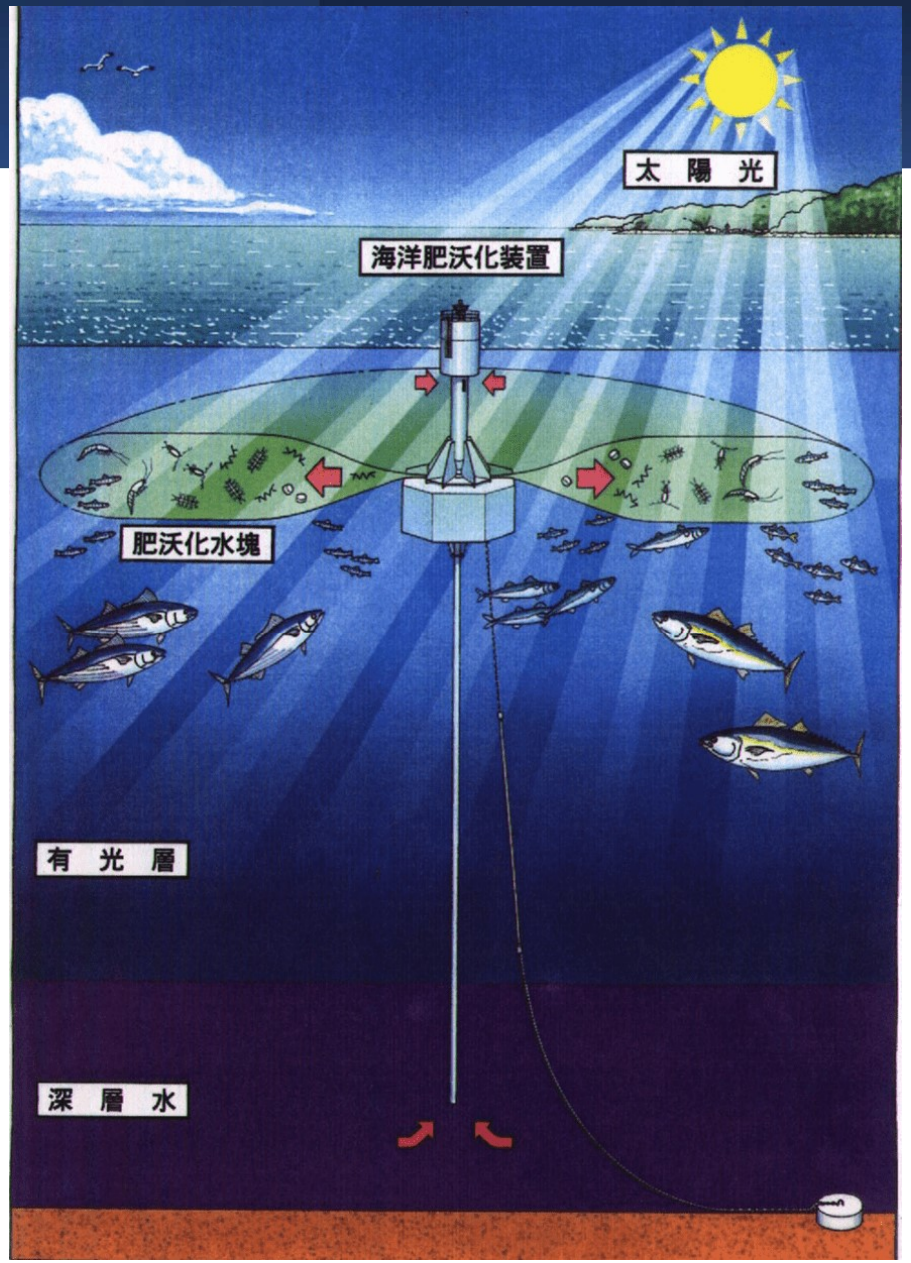


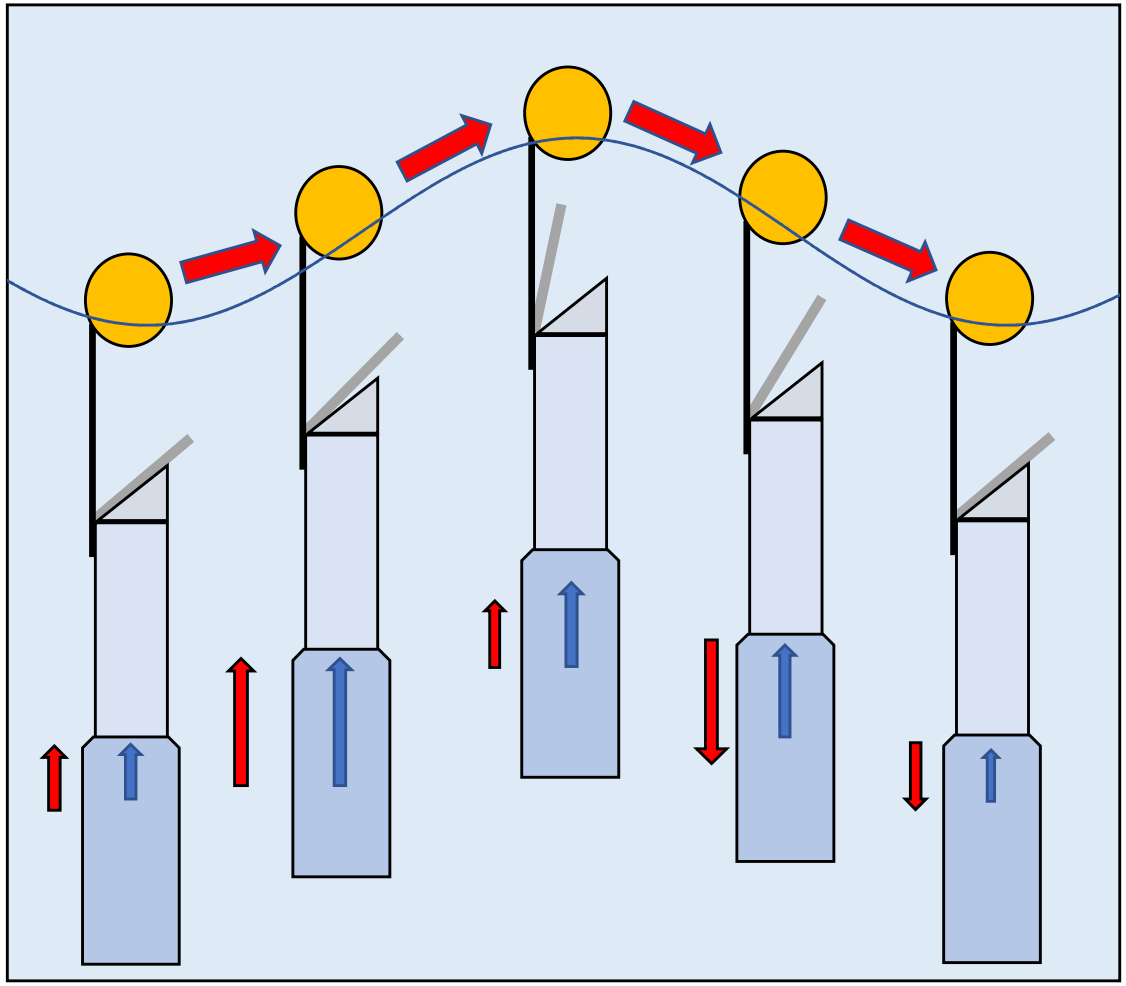
Examination of conditions for increasing pumping capacity of wave driven upwelling pump

AB18065 Haruki Kondo

Background



Principle



Theoretical Formula

$$V = Ax$$

$$Q = \frac{V}{T} = \frac{Ax}{T}$$

$$\eta = \frac{Q\prime}{Q}$$

V : Amount of water [m^3]

Q : Theoretical flow [m^3/s]

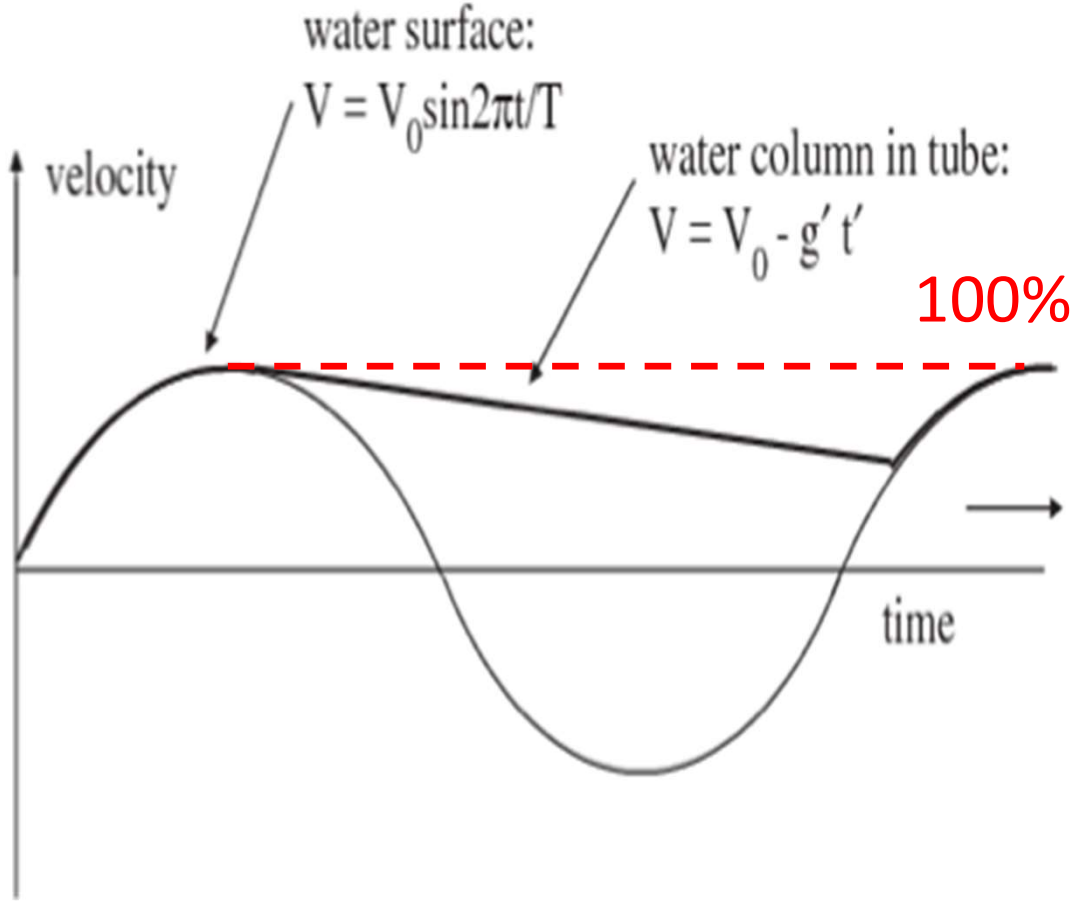
A : Cross-sectional area [m^2]

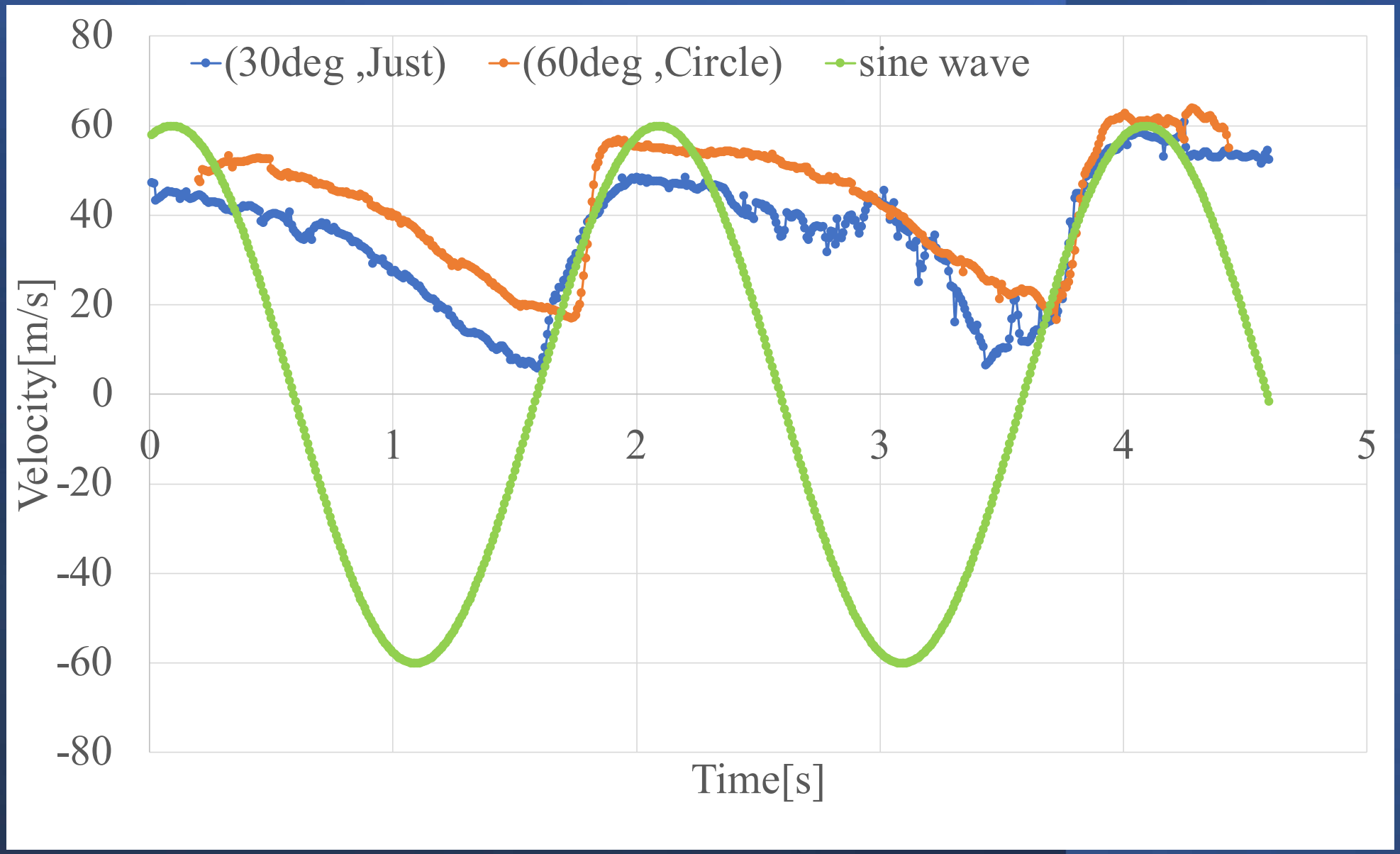
x : Distance [m]

T : Cycle [s]

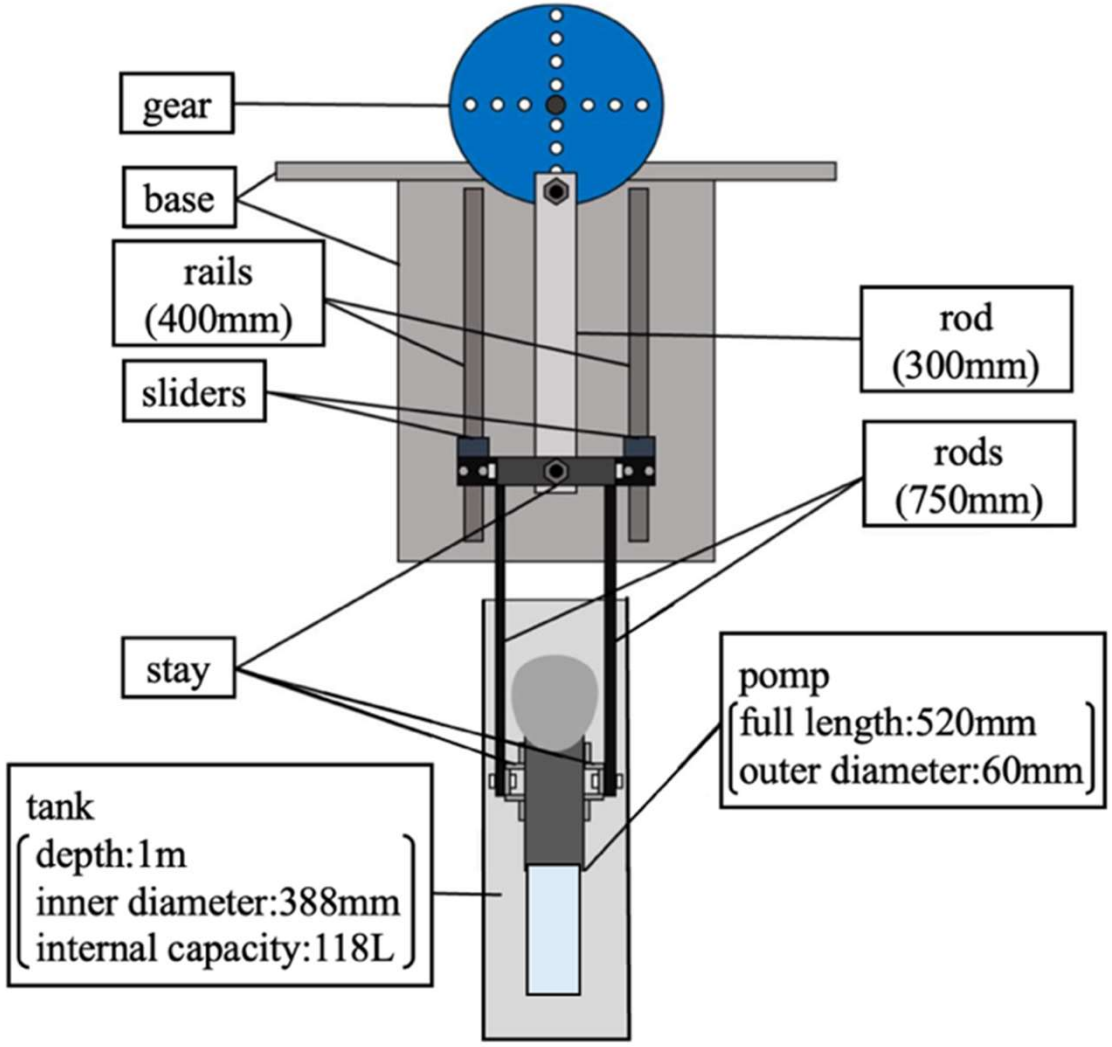
η : Upwelling efficiency

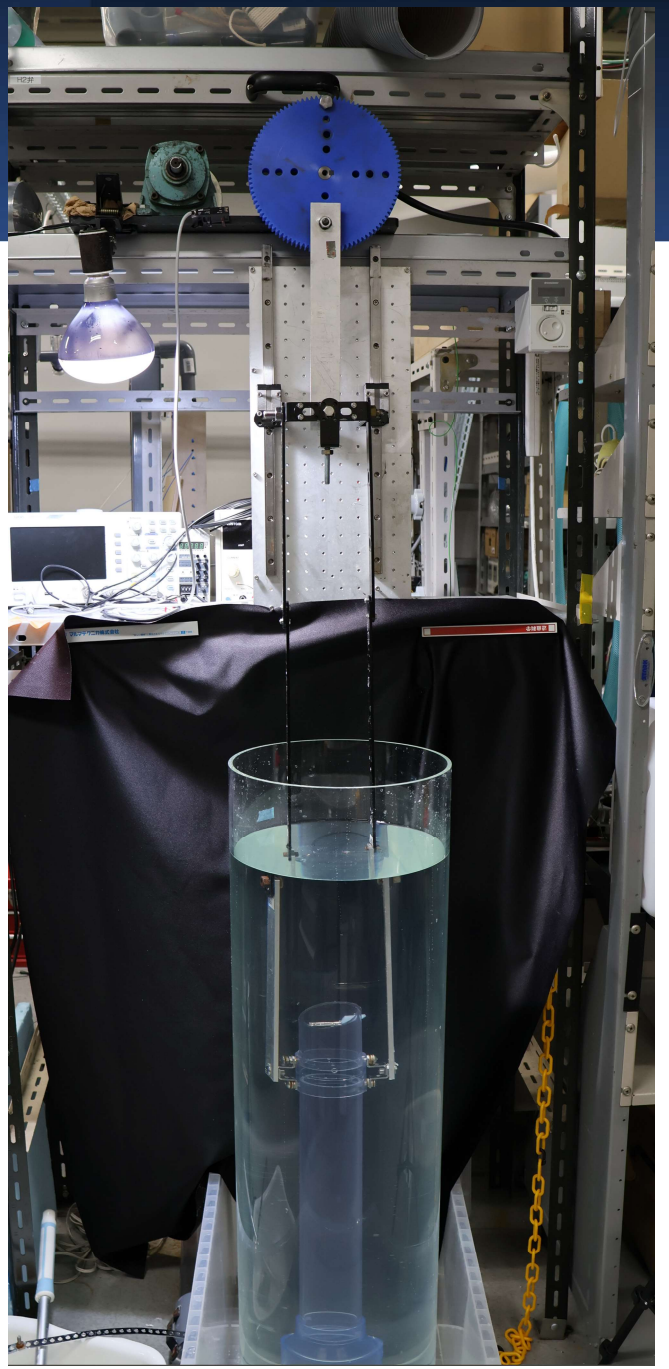
Q' : Measured flow rate [m^3/s]



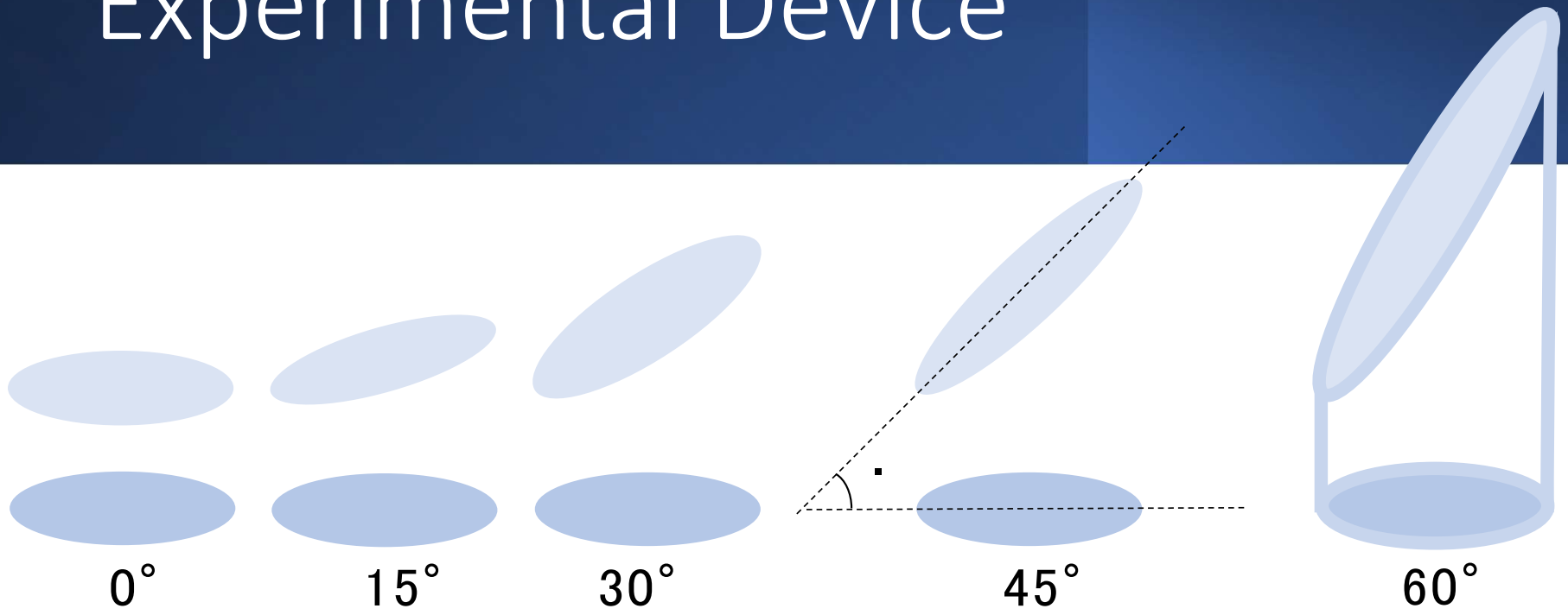

(30deg ,Just)
(60deg ,Circle)
sine wave
80
60
40
20
0
-20
-40
-60
-80
Velocity[m/s]
0
1
2
3
4
5
Time[s]

Experimental Device

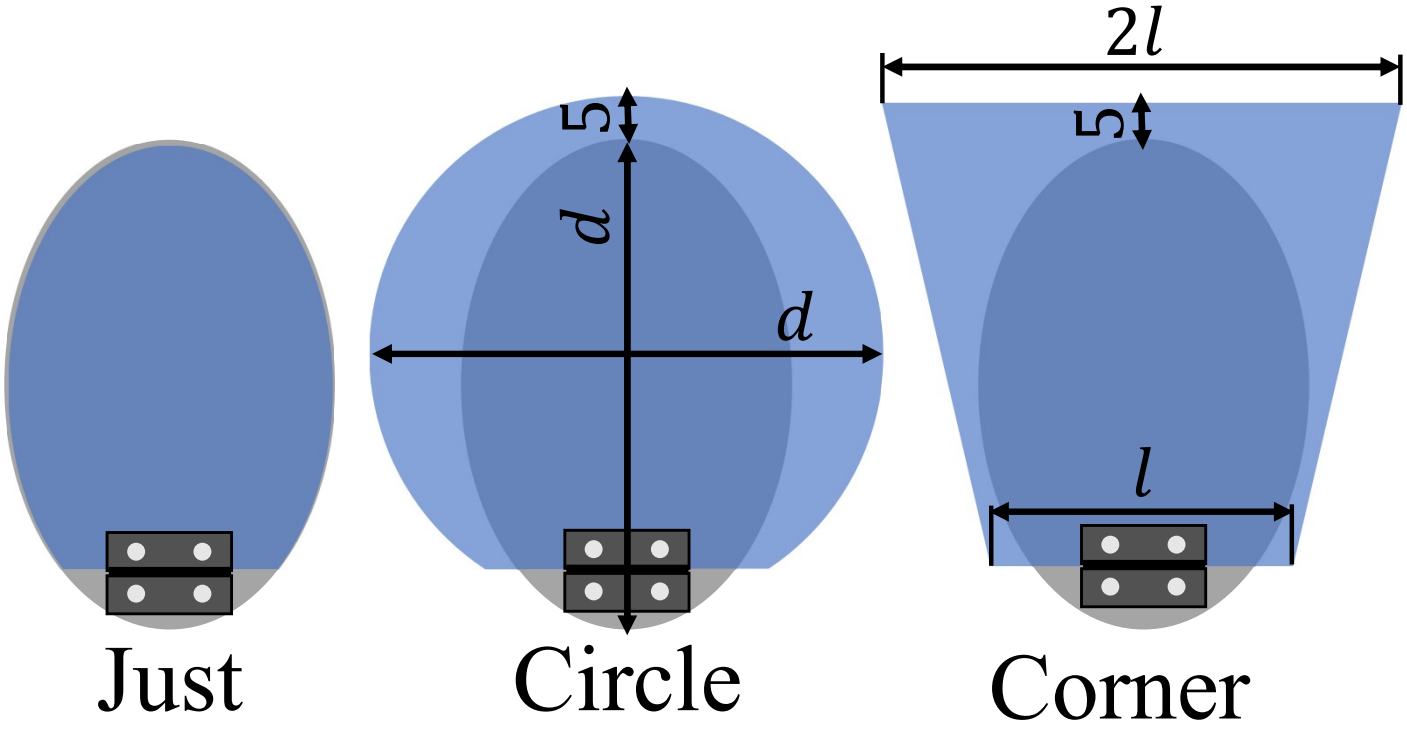


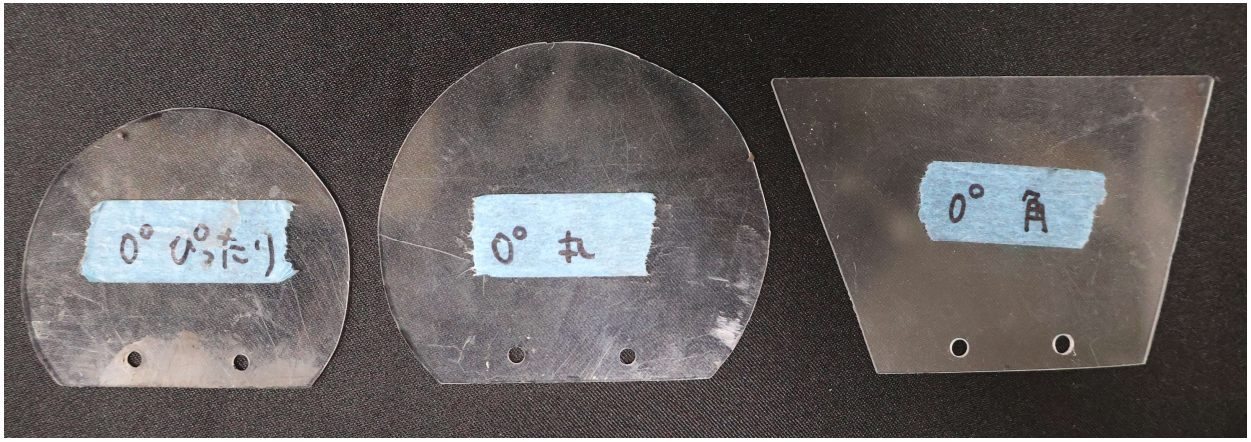


Experimental Device

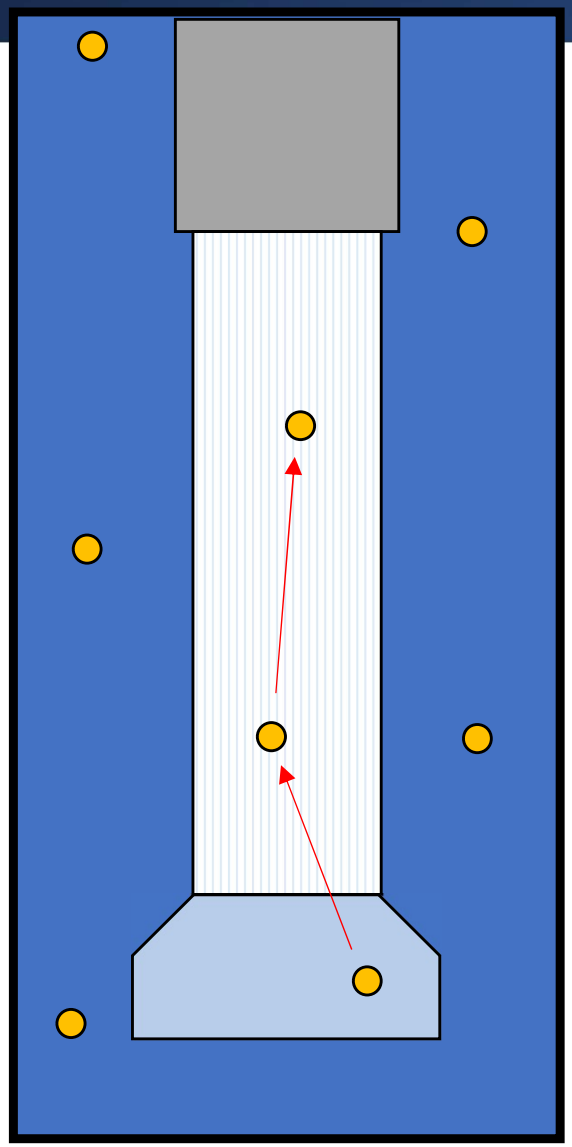


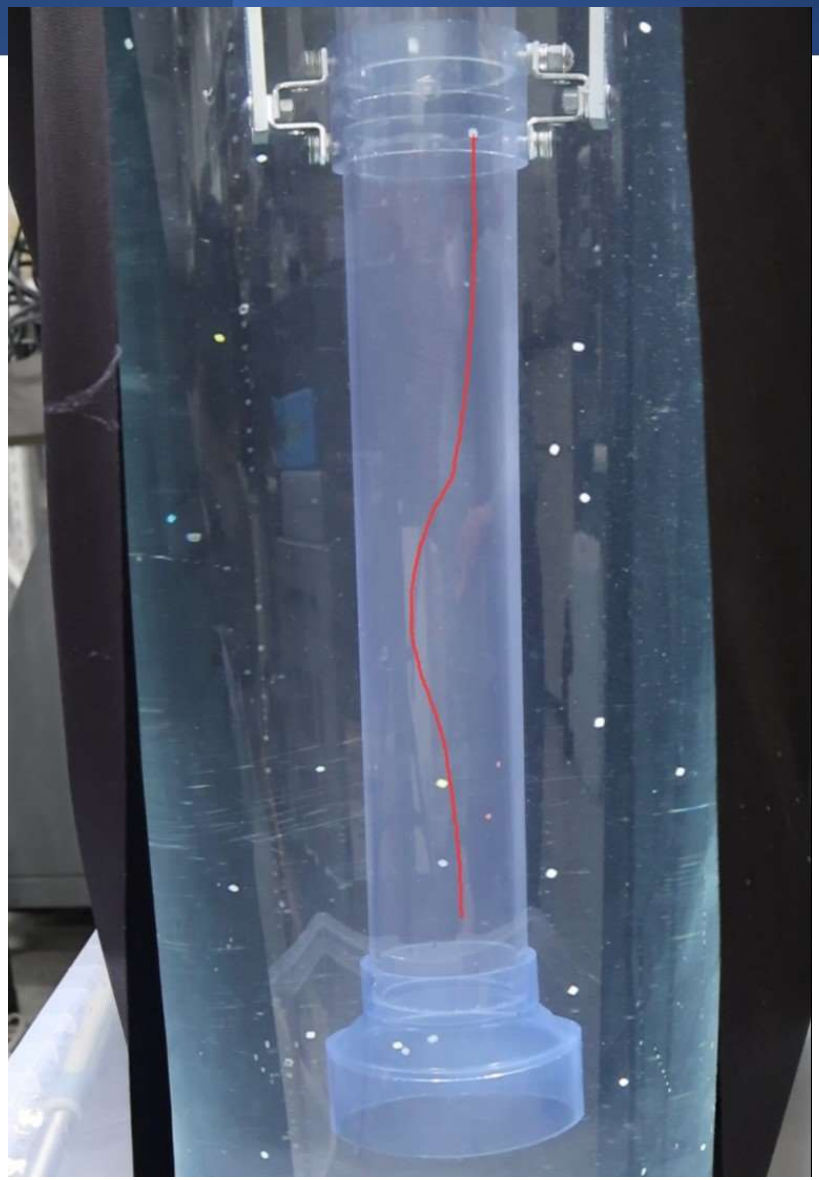
Experimental Device

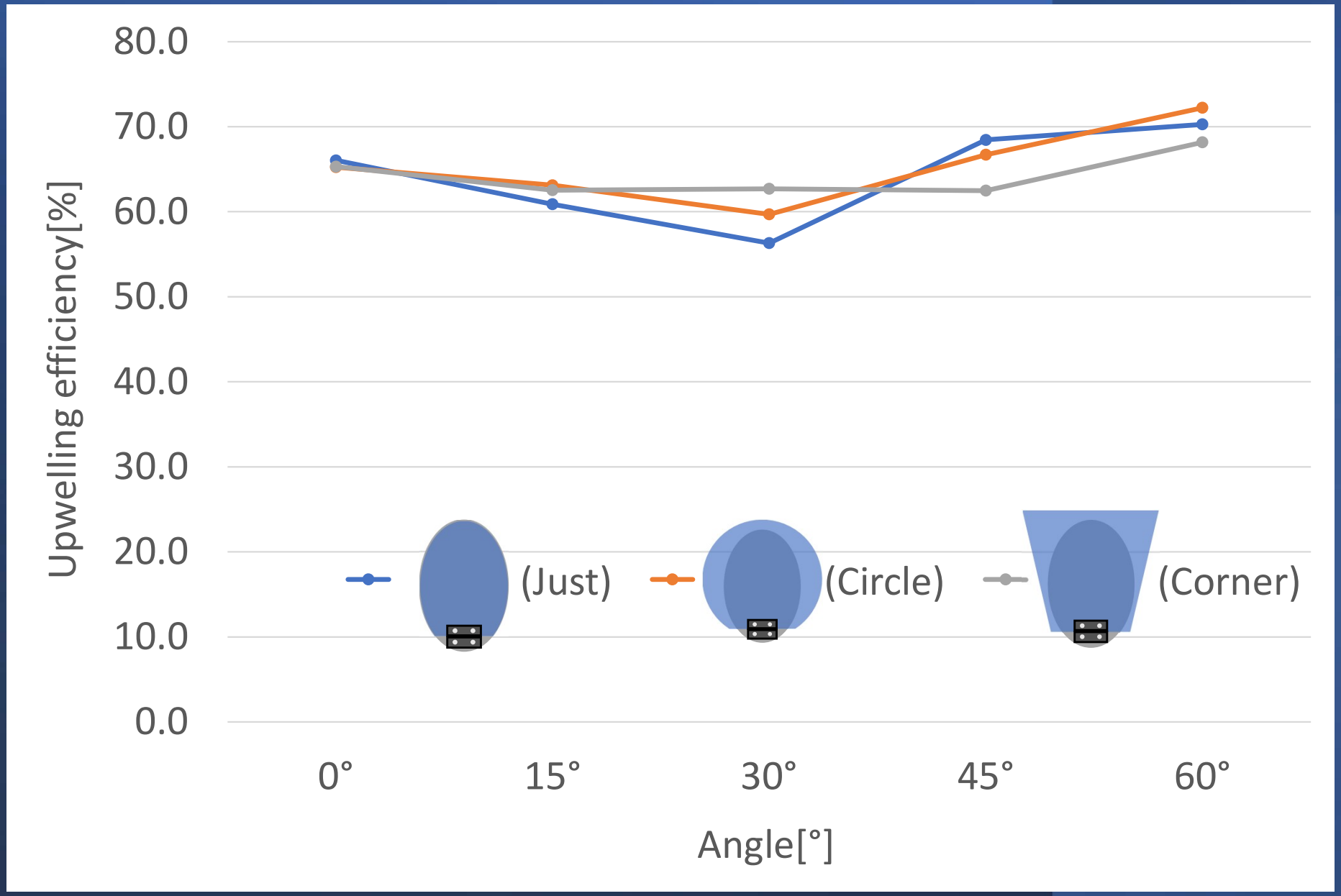


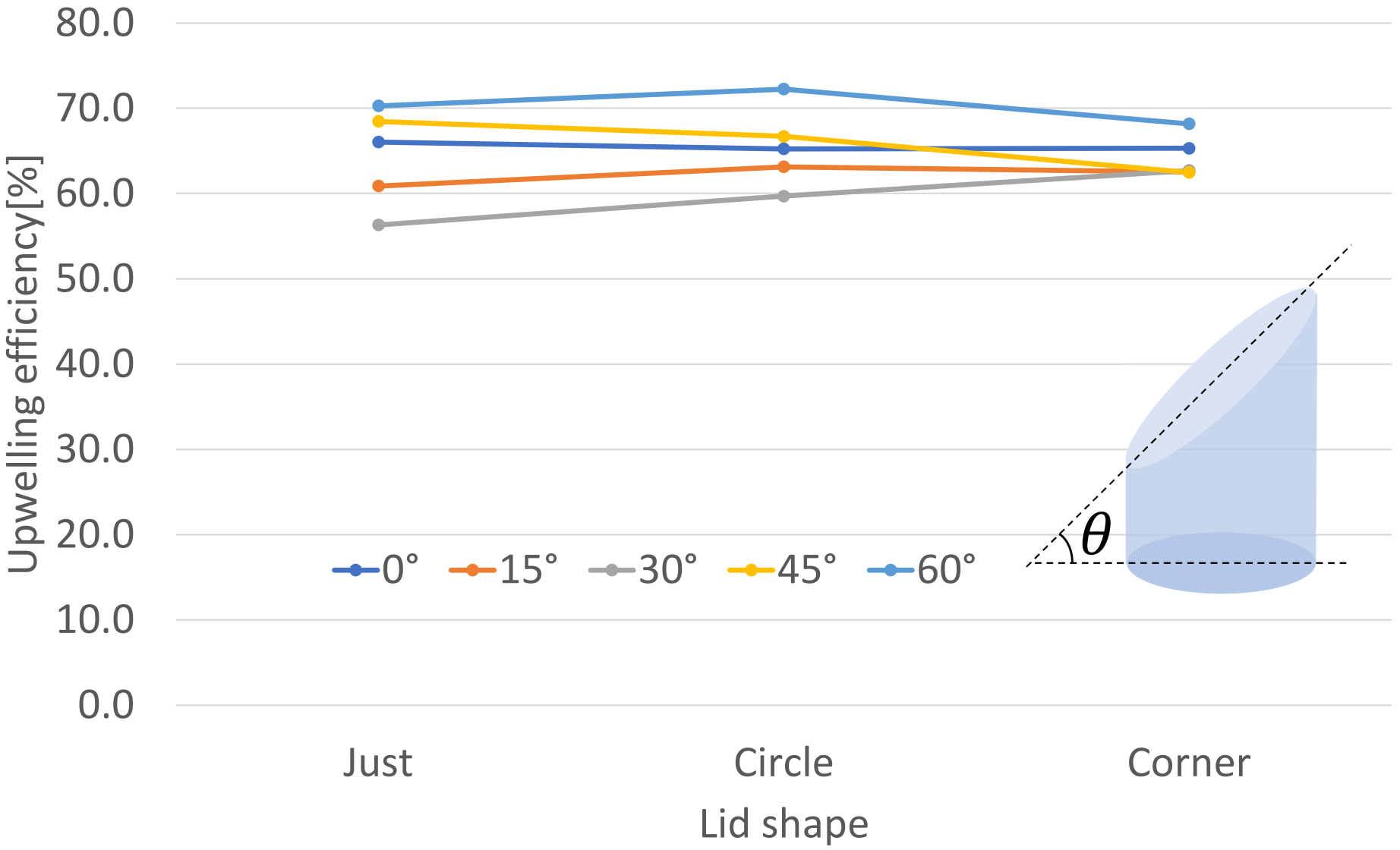


Experimental Method






80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Upwelling efficiency[%]
(Just)
(Circle)
(Corner)
0°
15°
30°
45°
60°
Angle[°]


80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Upwelling efficiency[%]
0°
15°
30°
45°
60°
θ
Just
Circle
Corner
Lid shape

Conclusion

- In this study, the maximum pumping rate was observed when the angle was 60 degrees and the lid shape was "Circle".

- No differences in performance were observed between lid shapes.


Thank you for your attention