

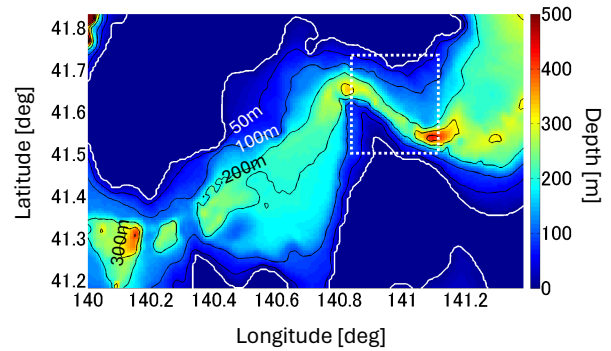
潮流と海流の数値シミュレーション

MITgcm(MIT General Circulation Model)

$$\left\{ \begin{array}{l} \frac{D\mathbf{V}}{Dt} + 2\vec{\Omega} \times \mathbf{V} + \nabla\phi = \mathbb{F} \\ \nabla\mathbf{V} = 0 \end{array} \right. \quad \begin{array}{l} \vec{\Omega} : \text{Angle Velocity} \\ \mathbf{V} : \text{Velocity} \\ \phi : \text{Pressure} \\ \mathbb{F} : \text{Forcing/Dissipation} \end{array}$$

Specifications

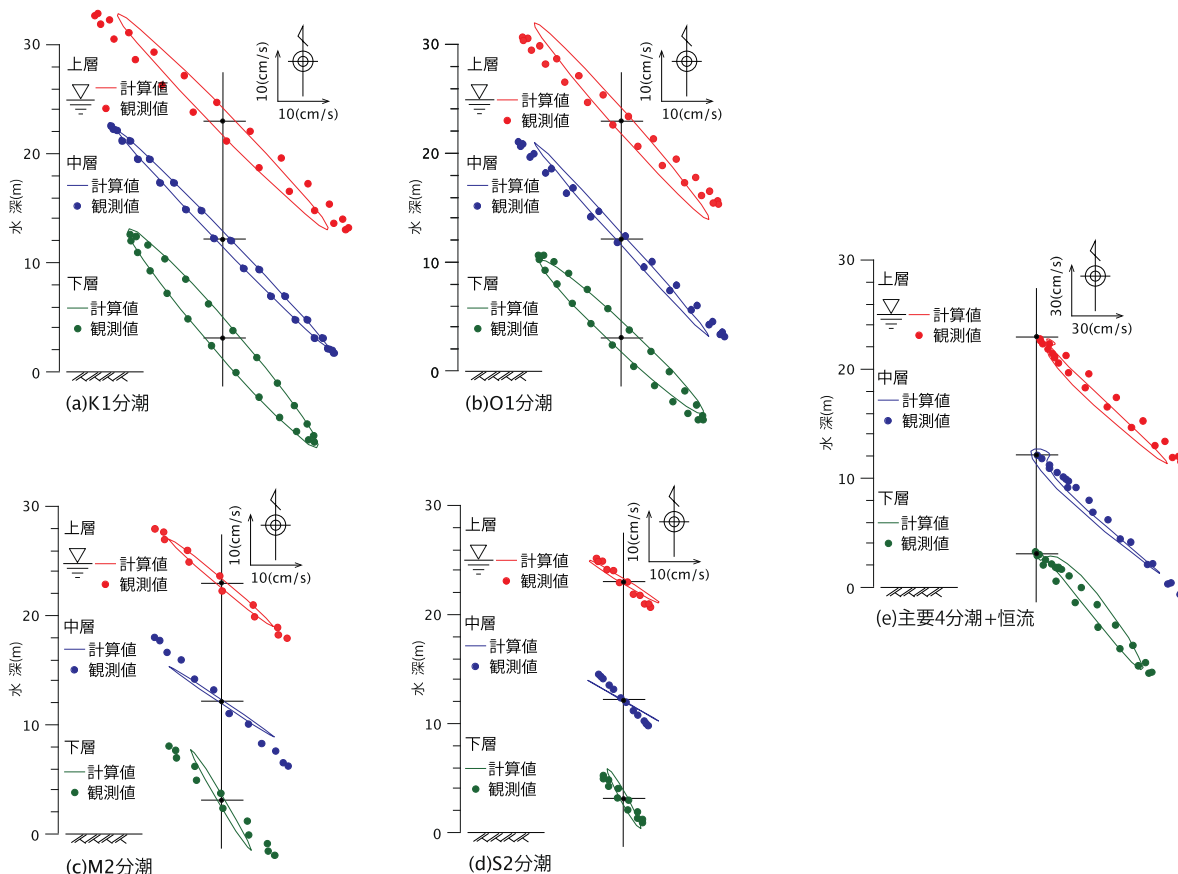
Computation Area	E140 -- E141.383, N41.183 -- N41.833
Mesh Size ($\Delta\text{lon} \times \Delta\text{lat}$)	30sec x 30sec
Mesh Size (Vertical)	1.0m--15.0m
Time Step	10sec
Bottom Boundary	Slip Boundary Condition
Computation Start Time	2013/3/15/00:00 (UTC)~



Computation Cases

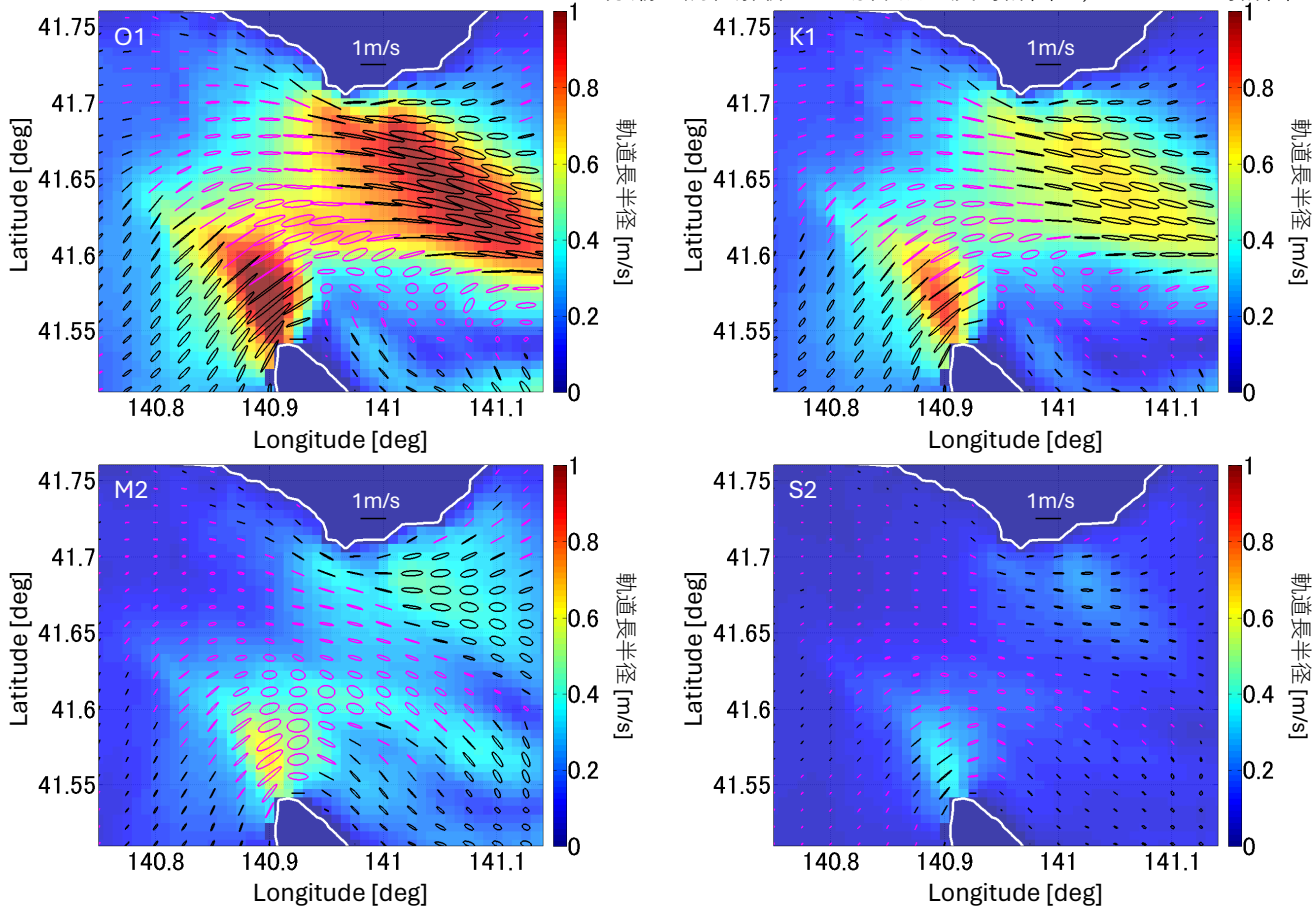
Case #	1	2	3
Tidal Current	Inflow boundary are given by the principal 9 tidal current components due to TPX07.2 .		—
Ocean Current	—	Inflow boundary are given by the reproduction result of its current due to JAMSTEC FRA-JCOPE2 .	

潮流楕円による数値計算の再現性と妥当性

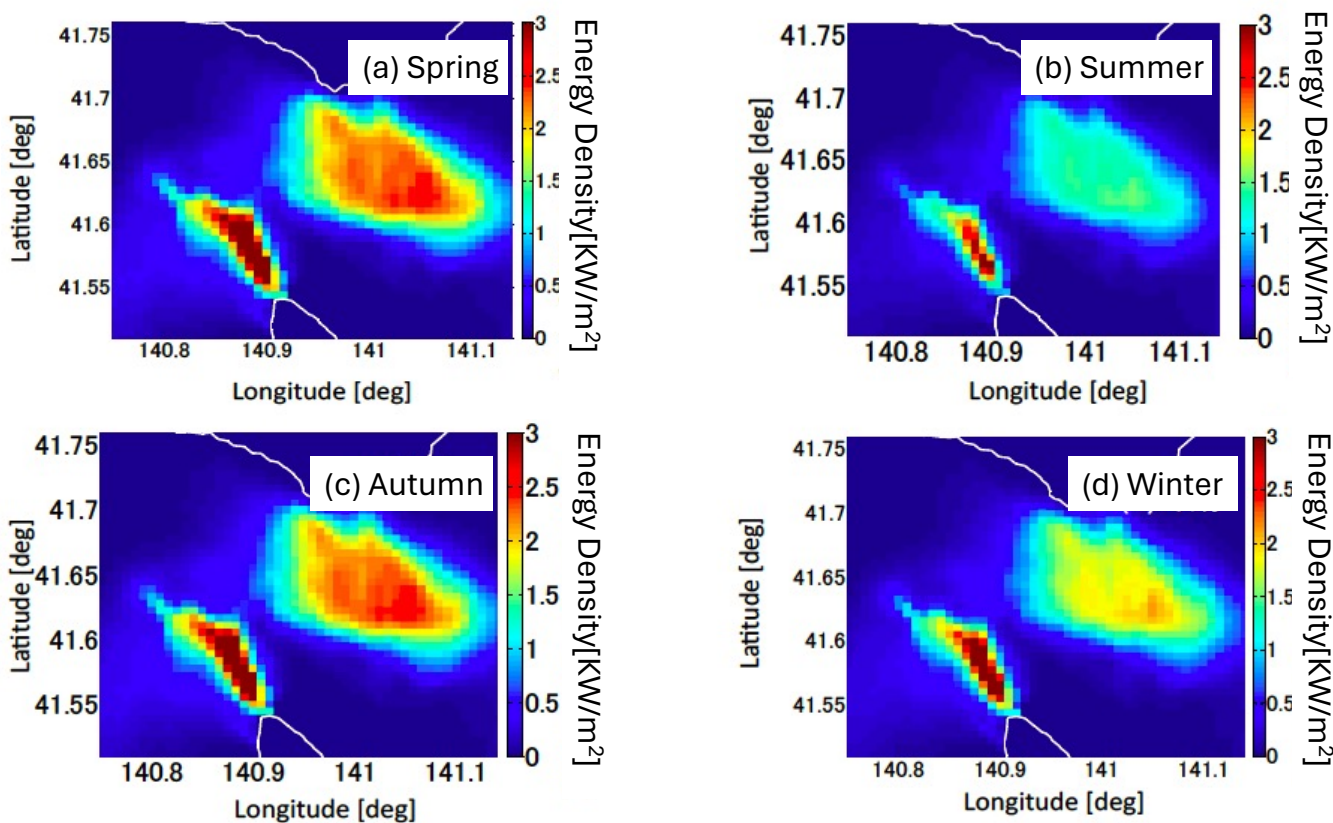


潮流楕円分布(Case2, 潮流+海流, 上層, 春期)

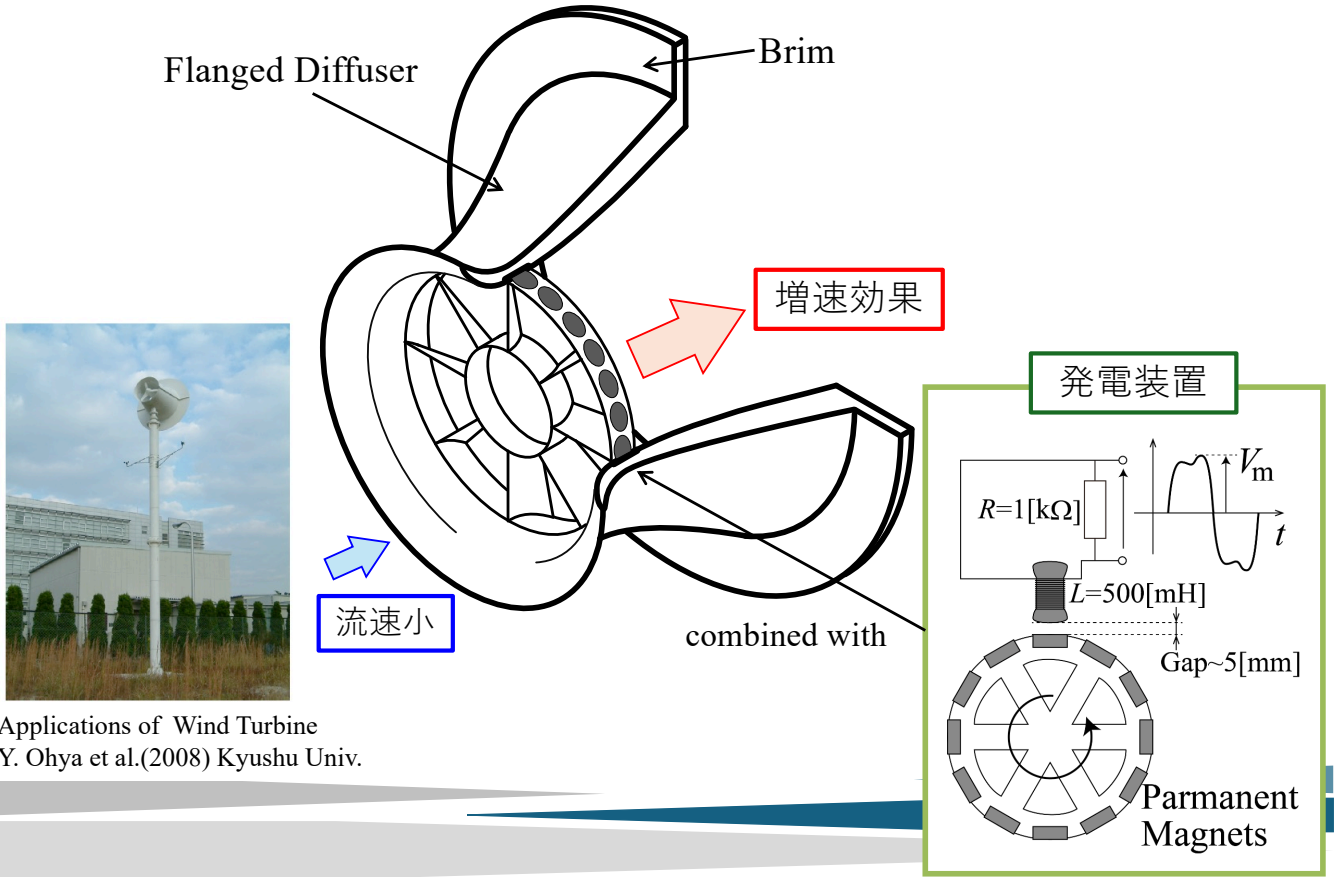
35分潮で調和解析した場合 黒：反時計回り，ピンク：時計回り



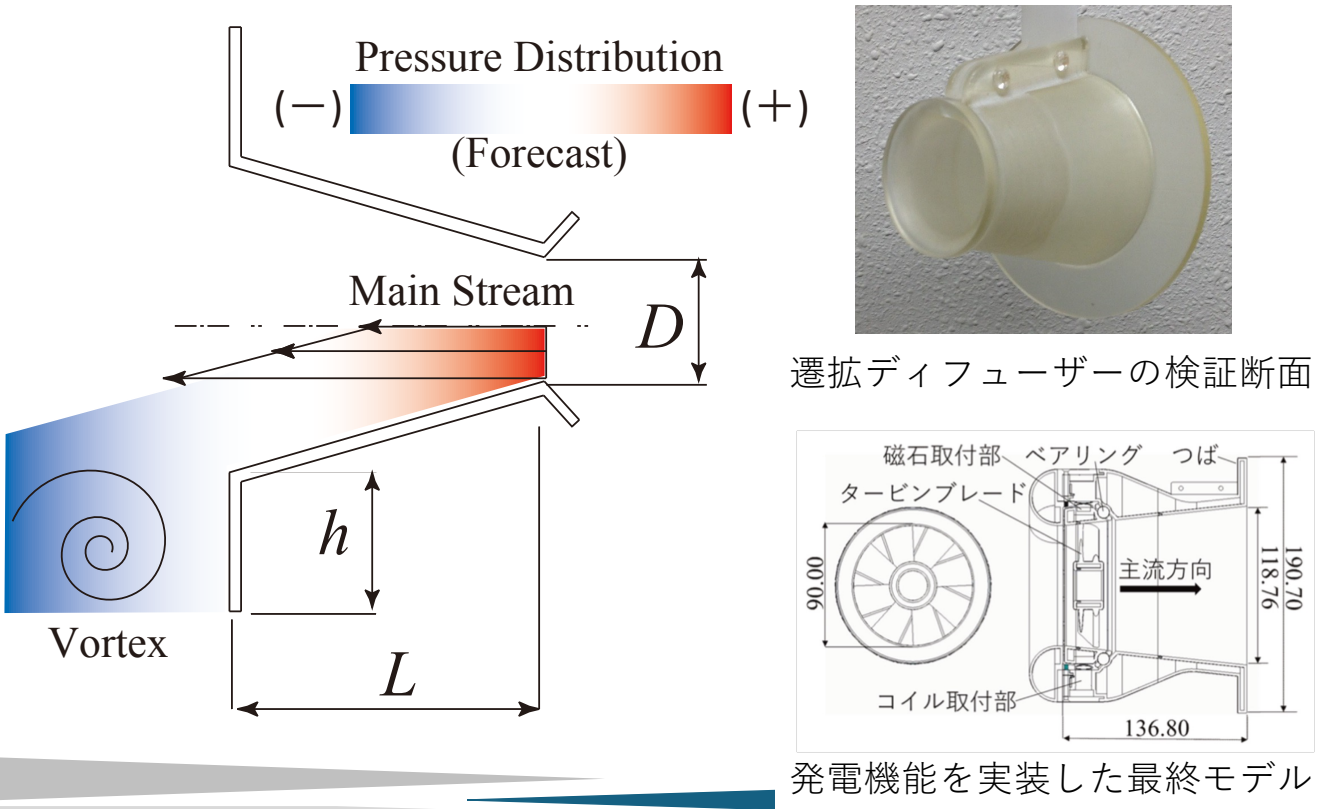
日周期分潮による潮流と海流のエネルギー密度分布(上層)



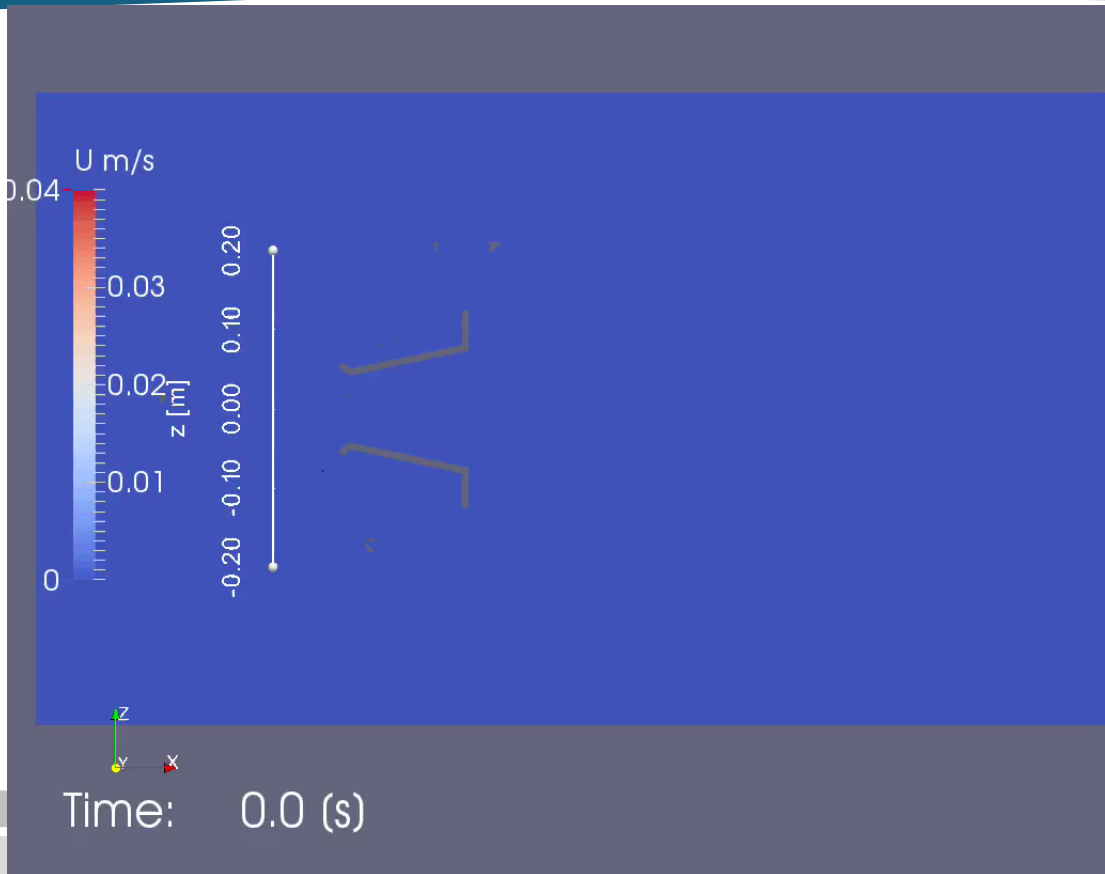
つば付き遷拡型ディフューザーによる潮海流発電



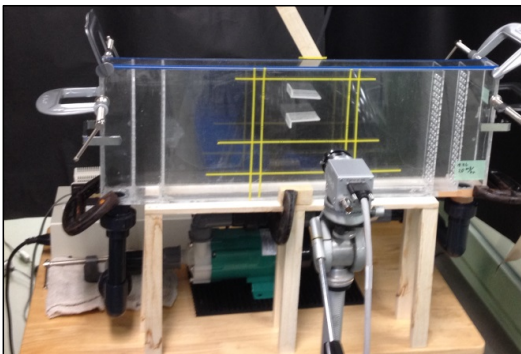
遷拡ディフューザーによる増速効果



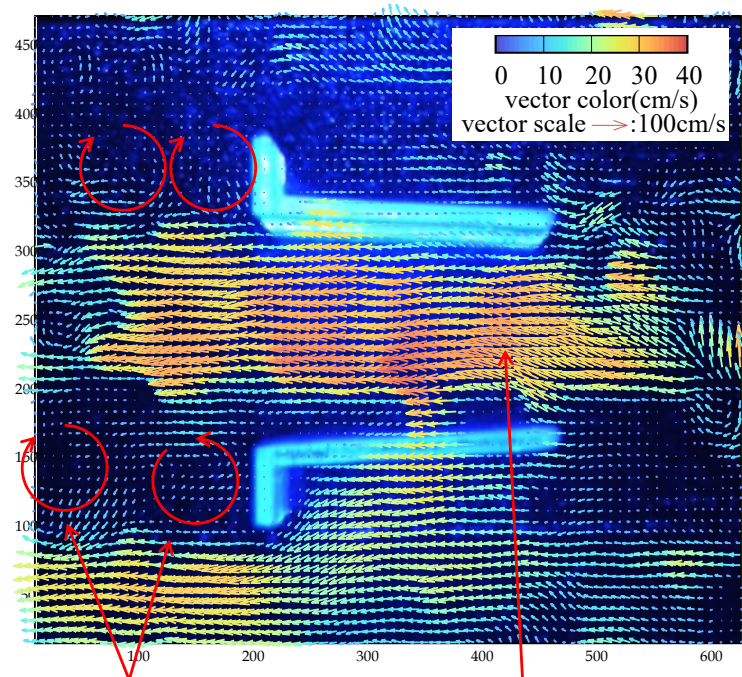
CFDによる遷拡ディフューザー増速効果の数値実験



PIVによる流れの可視化実験



Laser : blue(1W)
Particles : 70 μ m
High Speed Camera : 200fps
Main Stream : 16.5cm/s
Pump Capacity : 45L/min



Kalman vortex street

Speed Increment Effect