

Updates: Two-Phase Jet Simulation

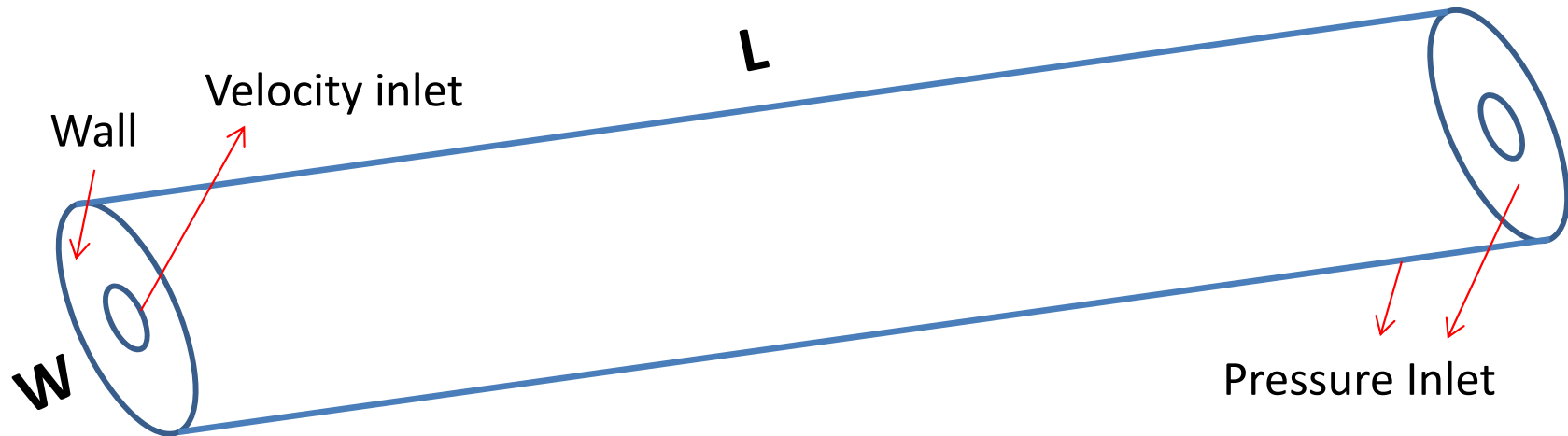
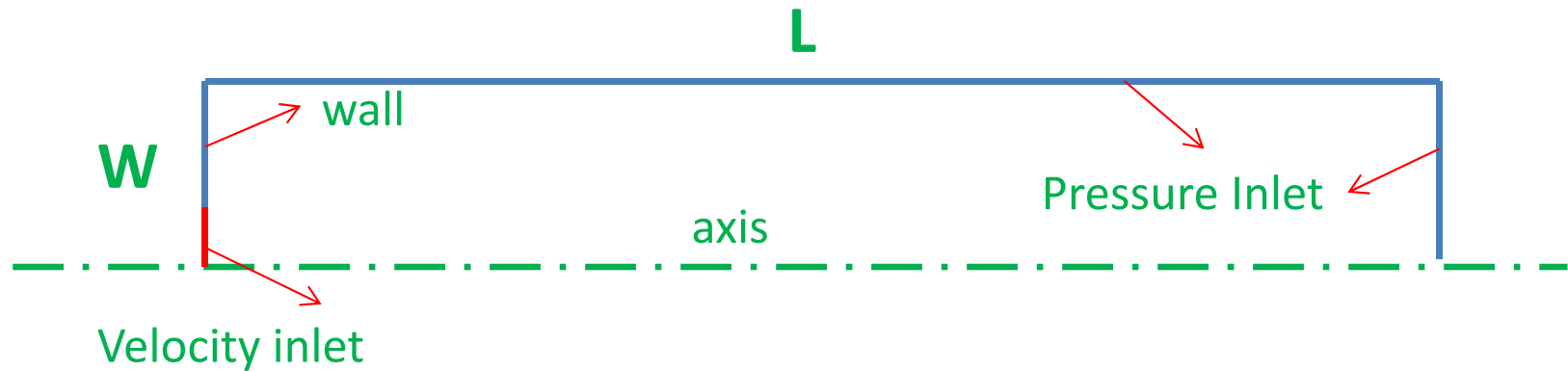
Yan Zhan

Feb. 13th 2014

Outlines

- 2D Simulation Of 1D Half-width Jet
- 3D Simulation Of 1D Half-width Jet
- 2D Simulation Of 3D Half-width Jet

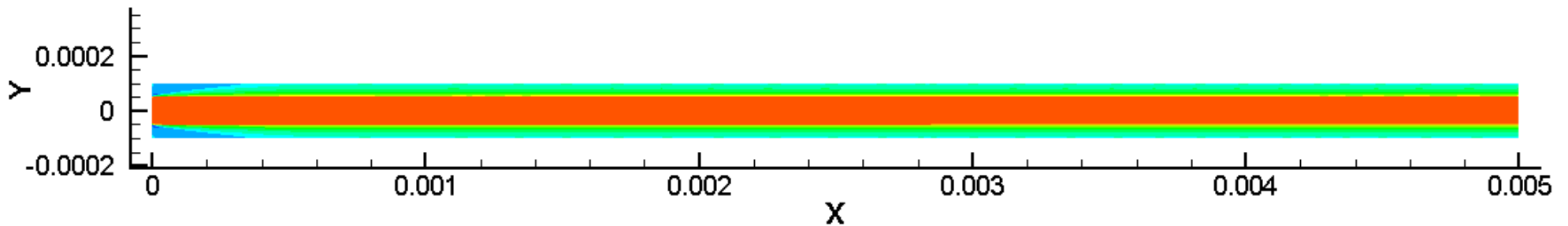
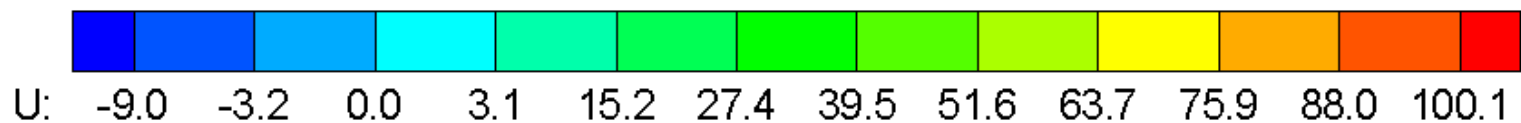
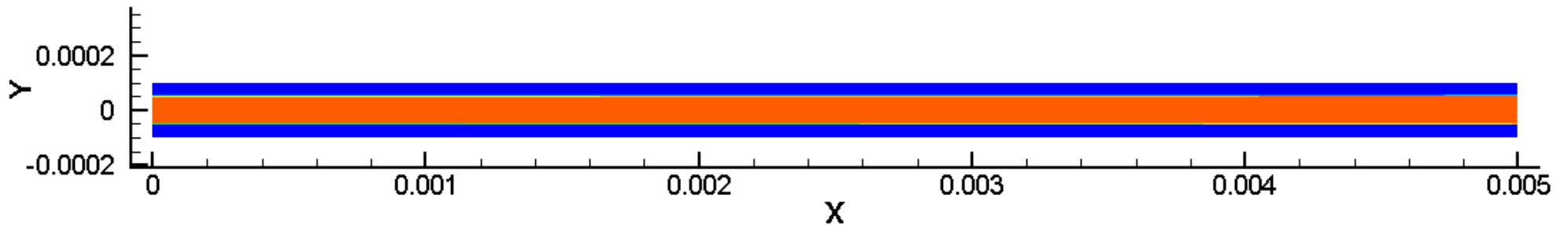
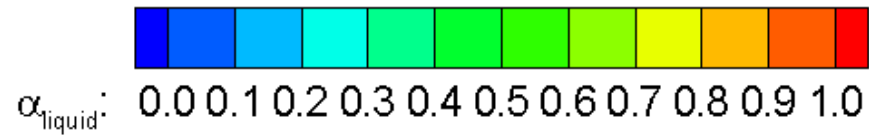
Boundary Conditions & Mesh



Case	Width (W)	Length (L)	Grid # in x (Nx)	Grid # in y (Ny)	Grid # in z (Nz)	Total Grid # (Nt)
2D	3D	50D	127	2120	1	269,240
	1D	50D	42	2120	1	89,040
3D	3D	50D	40	100	2120	8,480,000

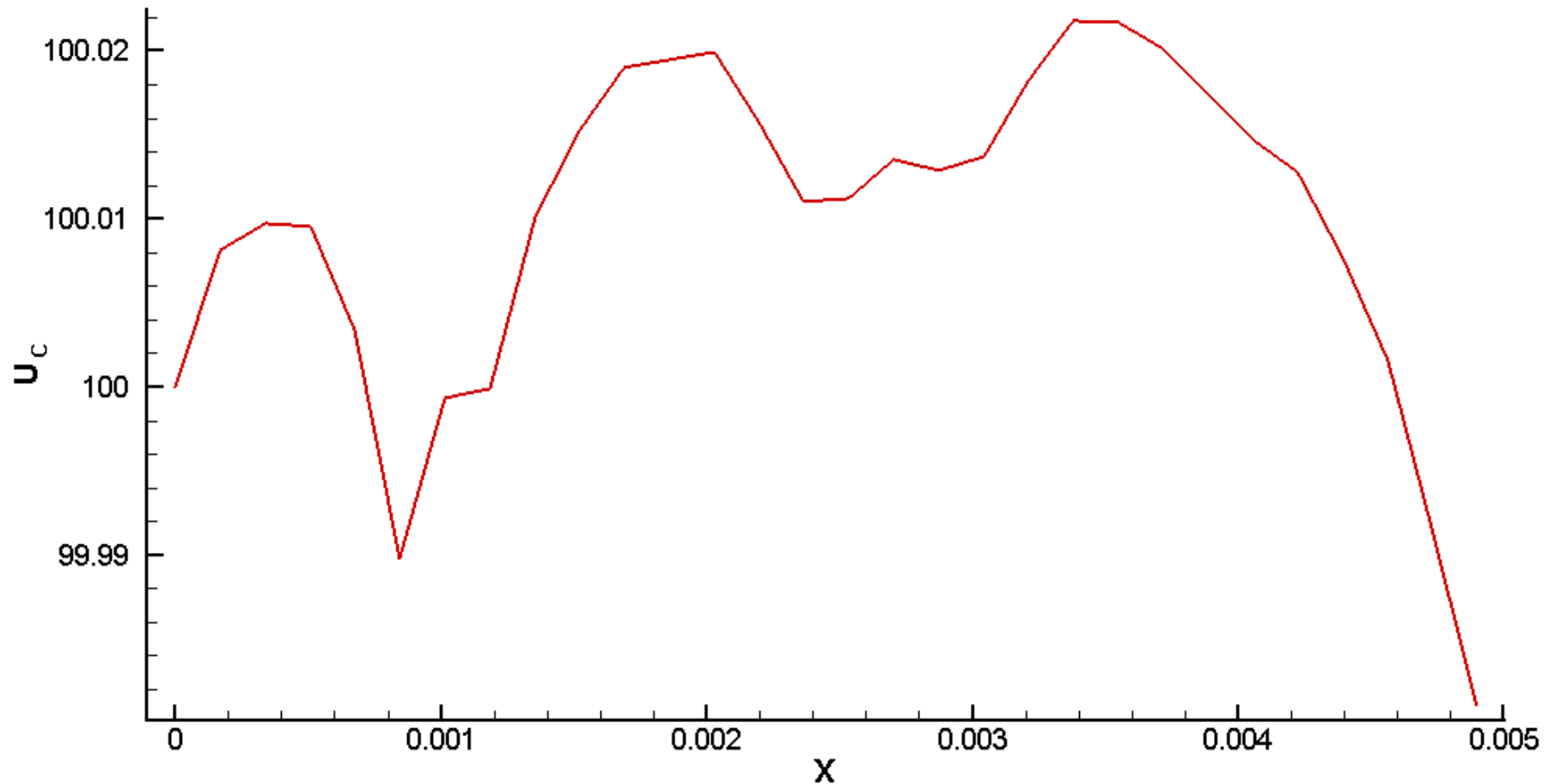
2D Simulation Of 1D Half-width Jet (Realizable k-e Model)

- $t = 5.6 \text{ ms}$



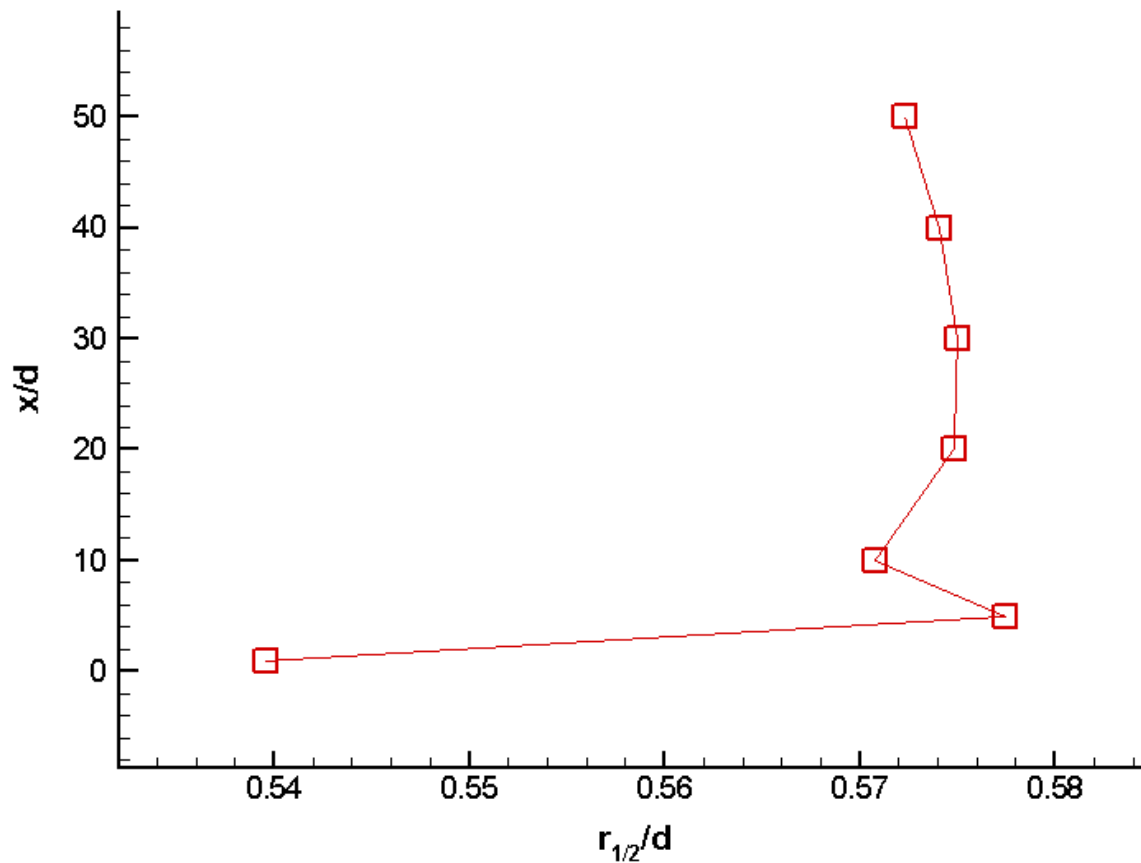
Results At t = 5.6 ms

- Centerline Velocity (U_c)



Results At t = 5.6 ms

- Jet Half Width ($r_{1/2}$)

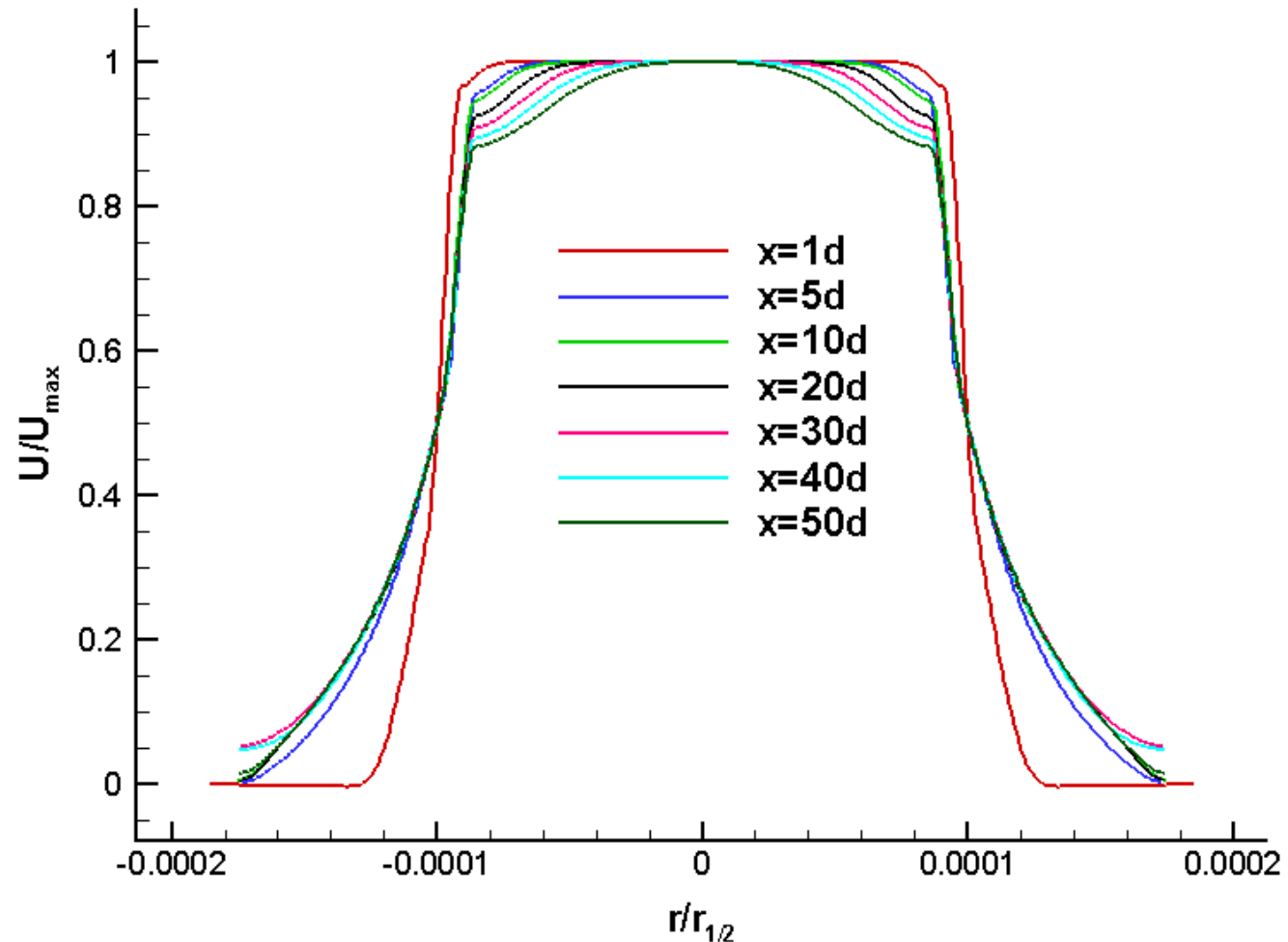


x/d	$r_{1/2}/d$
1	0.5396
5	0.57744
10	0.570829
20	0.574847
30	0.574978
40	0.574063
50	0.572267

Plot : $\frac{r_{1/2}}{d}$ vs $\frac{x}{d}$.

Results At t = 5.6 ms

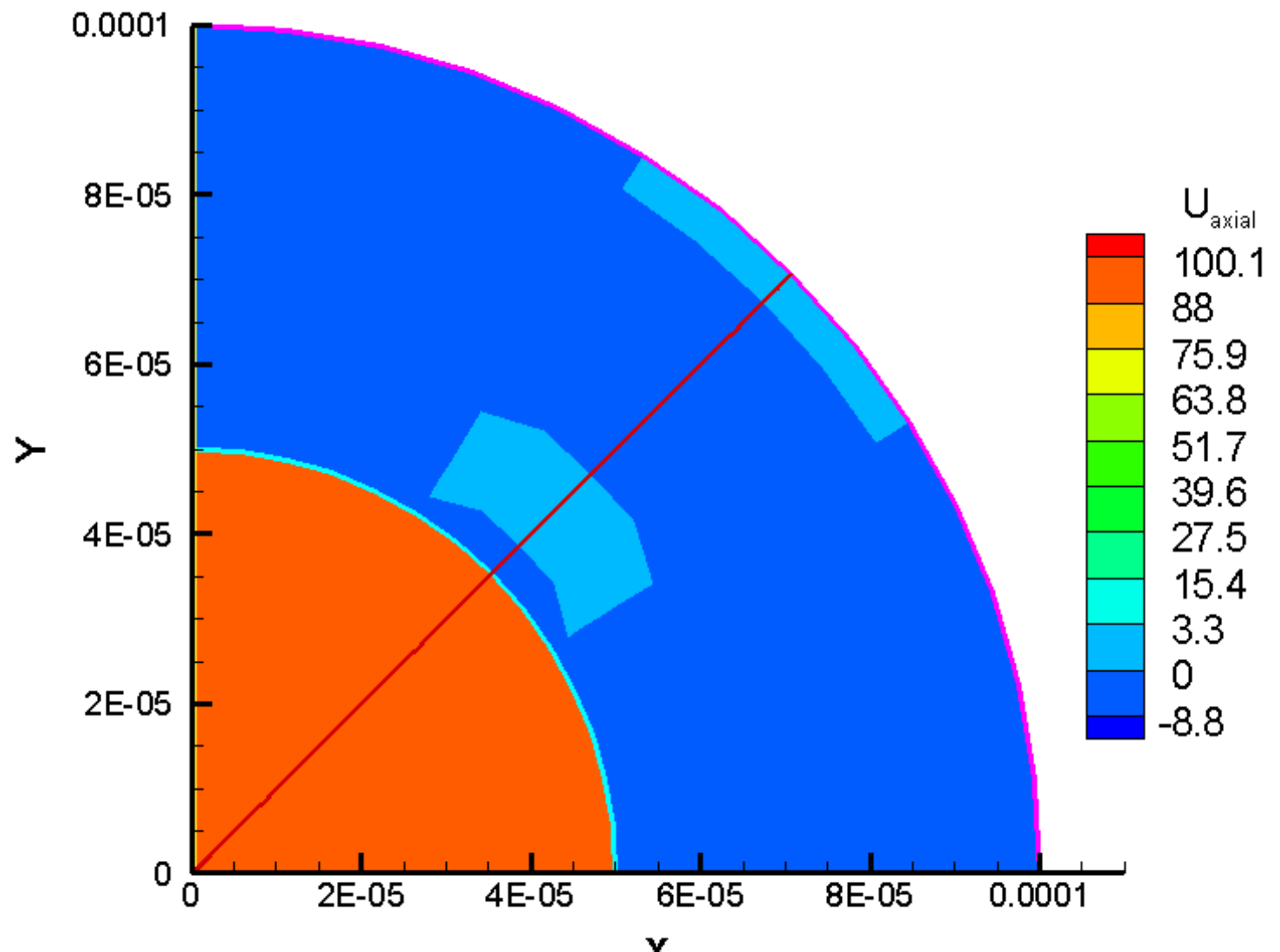
- Jet Self-similarity



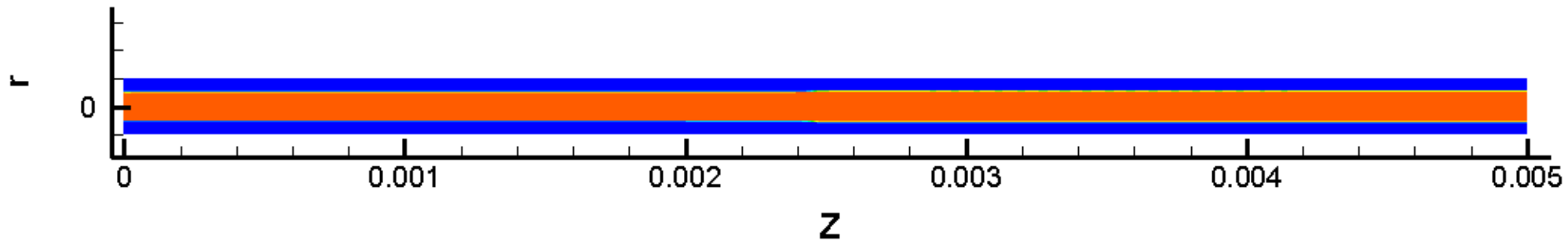
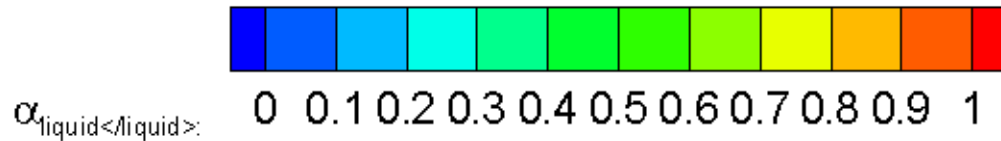
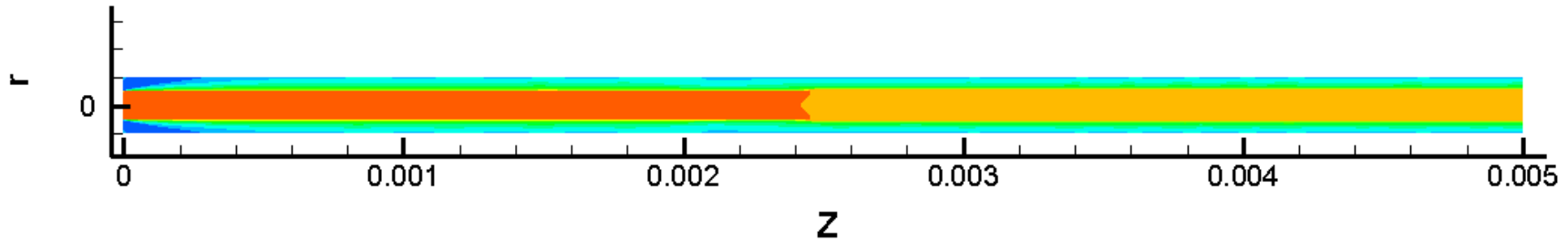
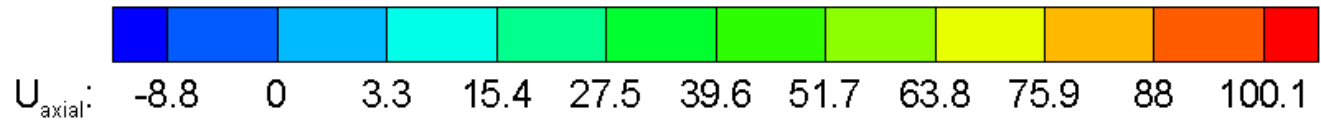
Plot : $\frac{r}{r_{1/2}}$ vs $\frac{\bar{u}_x}{\bar{u}_m}$, where \bar{u}_m is max (\bar{u}_x).

3D Simulation Of 1D Half-width Jet (Realizable k-e Model)

- $t = 1.75 \text{ ms}$

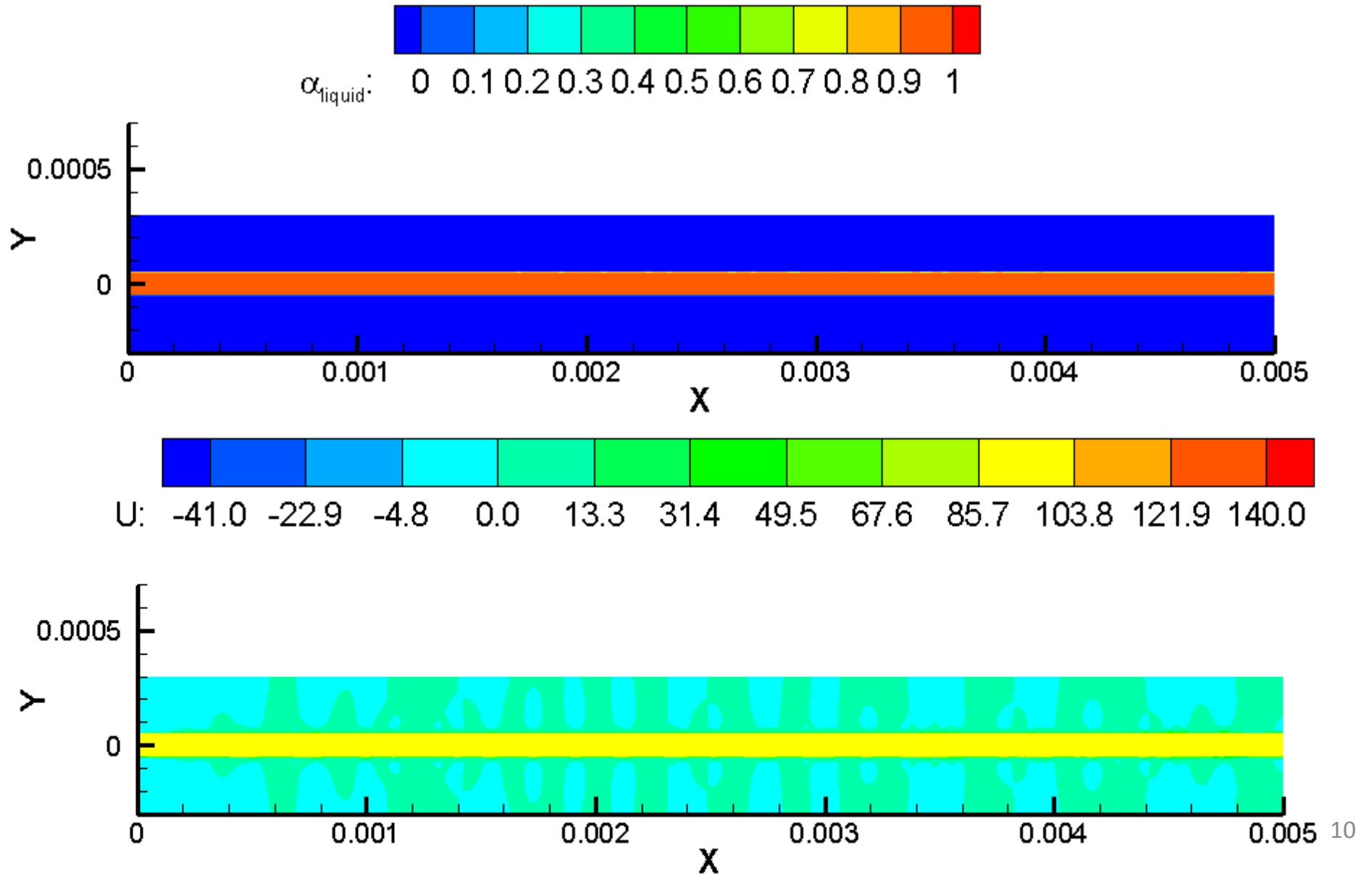


3D Simulation Of 1D Half-width Jet (Realizable k-e Model)



2D Simulation Of 3D Half-width Jet

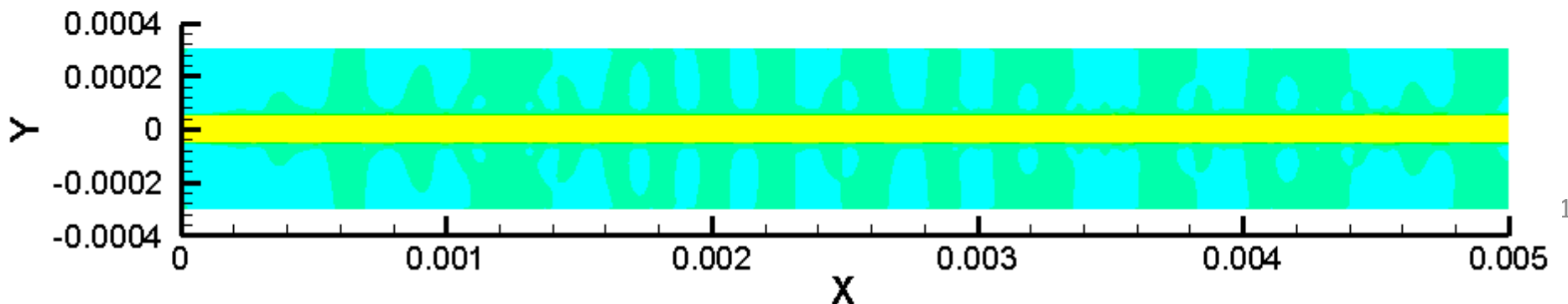
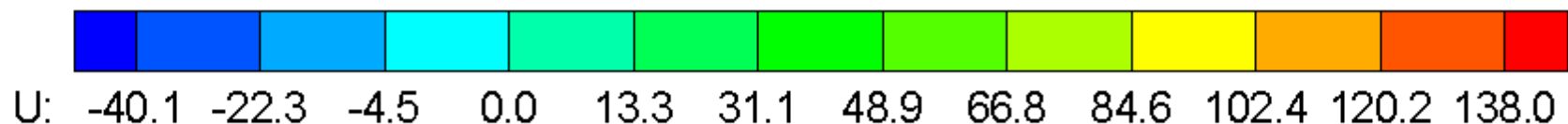
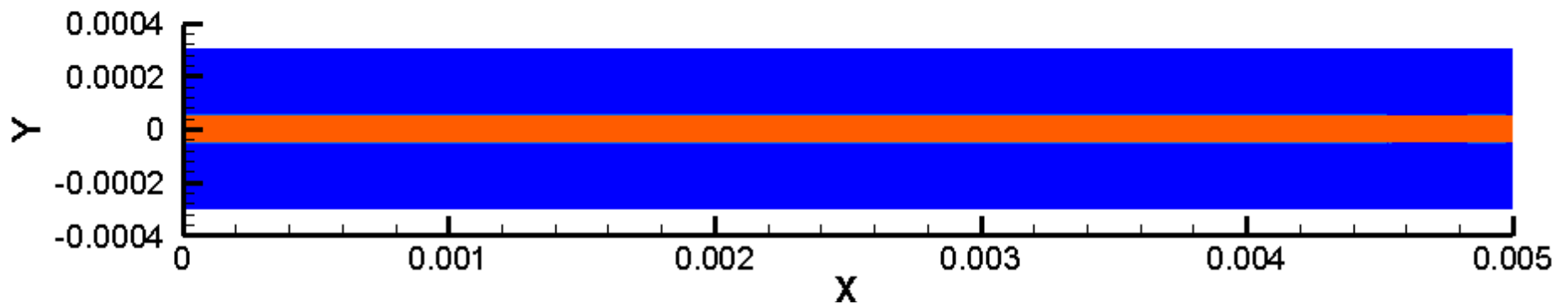
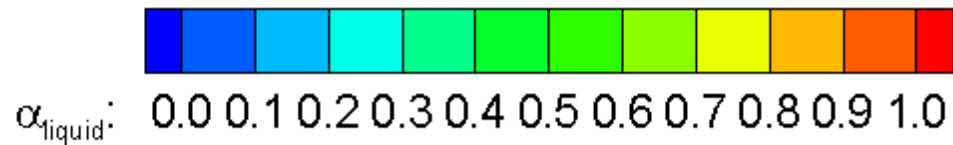
- Initialization (t = 0 s)



2D Simulation Of 3D Half-width Jet

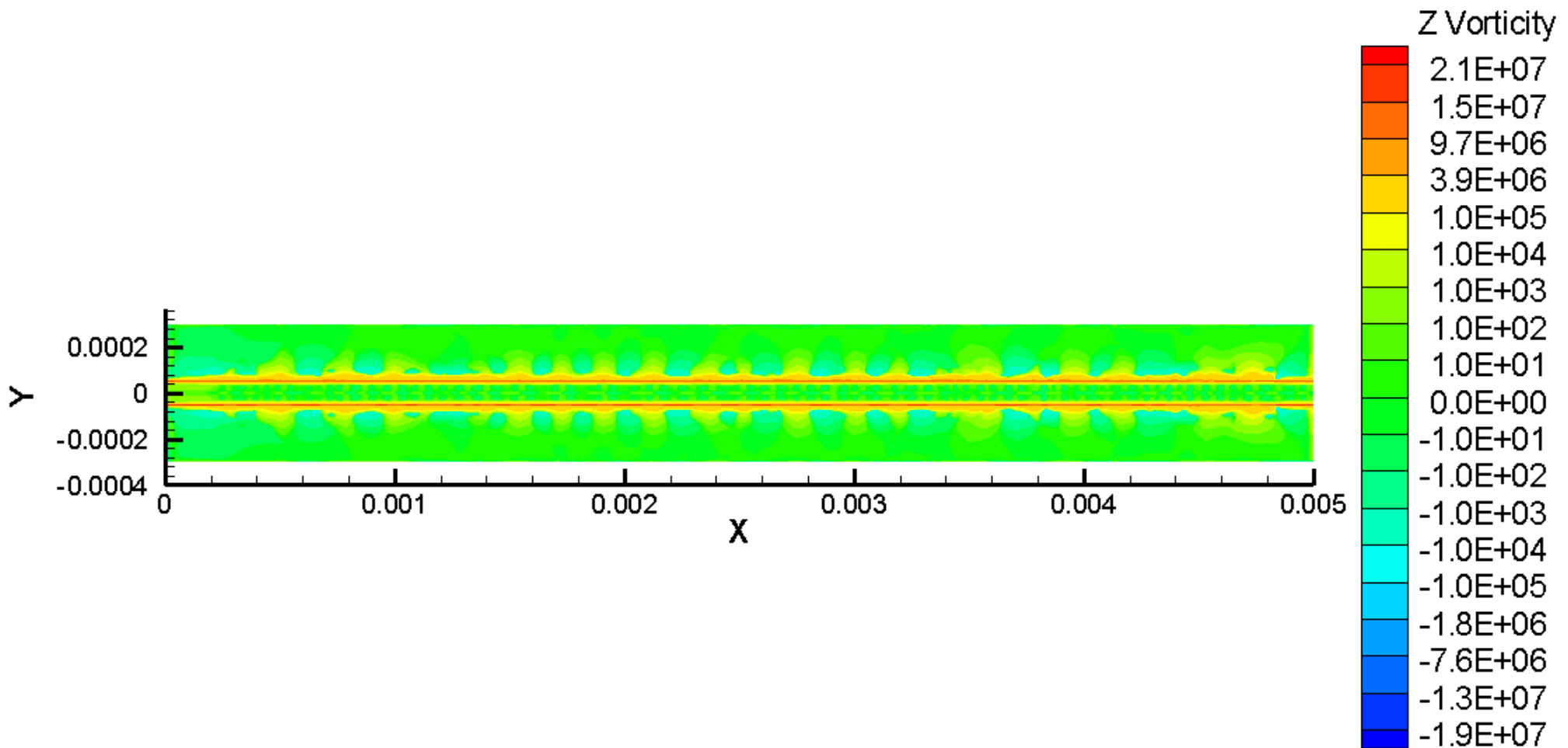
(click to watch the movie)

Laminar Model
($0 < t < 5.3$ ms)



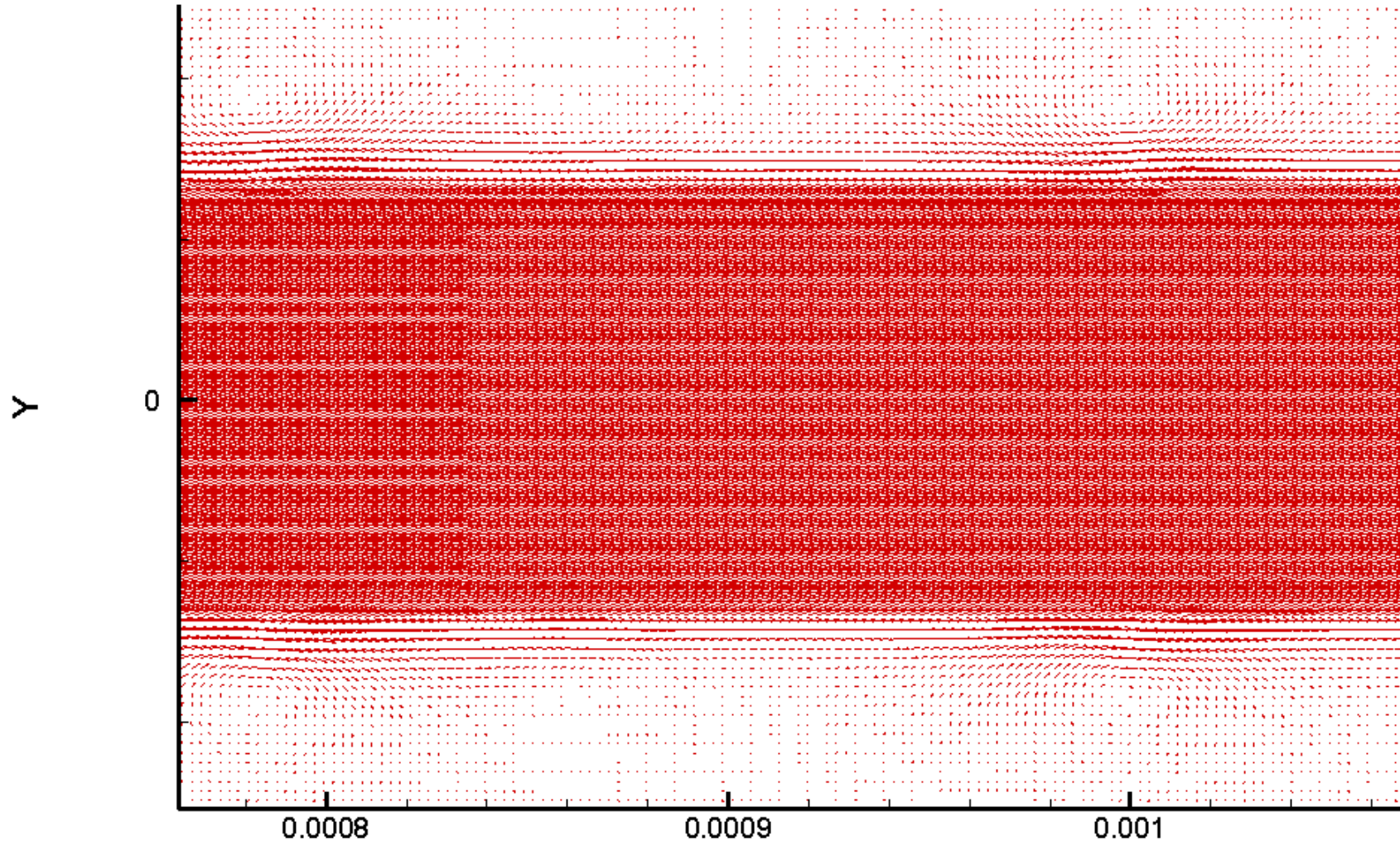
2D Simulation Of 3D Half-width Jet

(click to watch the movie)



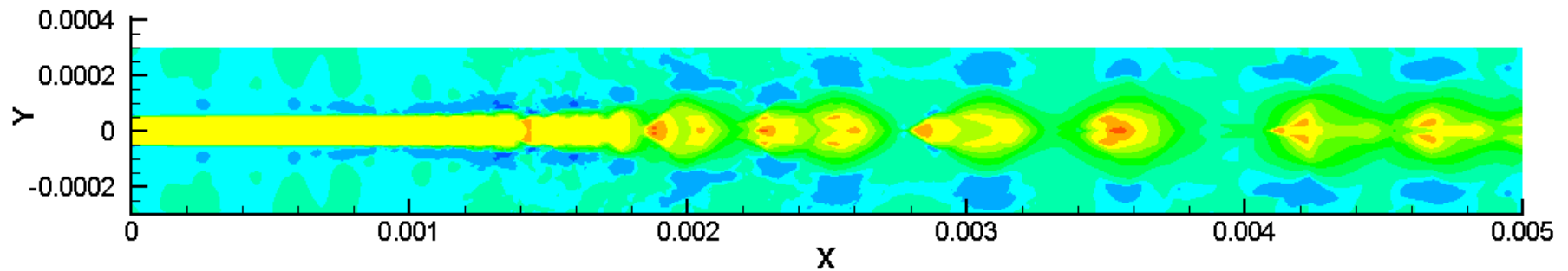
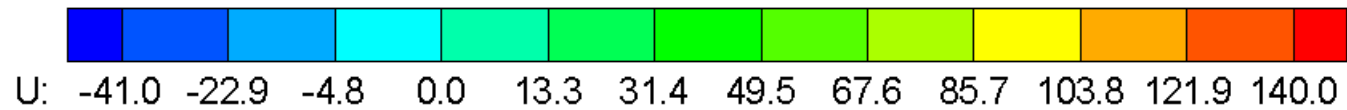
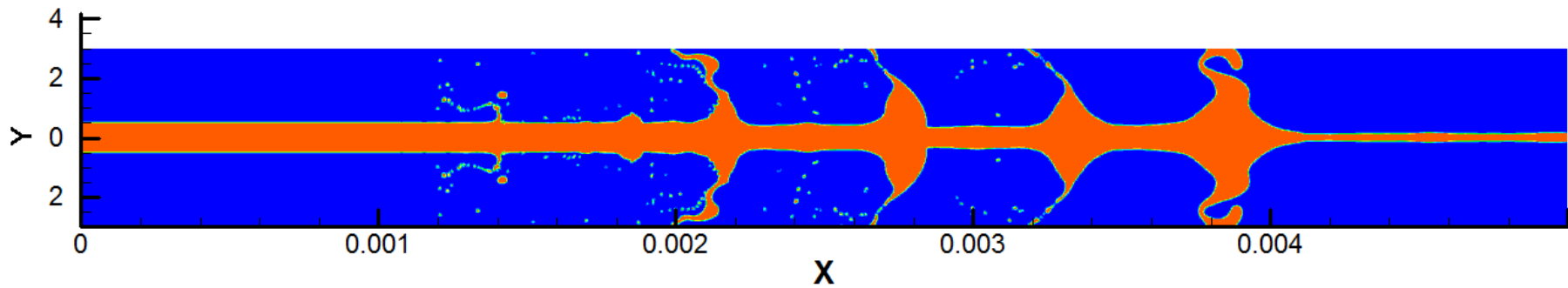
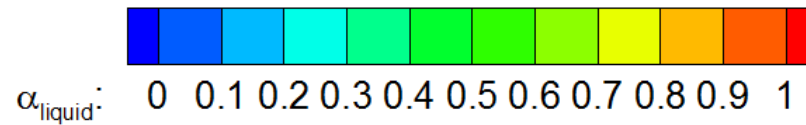
2D Simulation Of 3D Half-width Jet

(click to watch the movie)



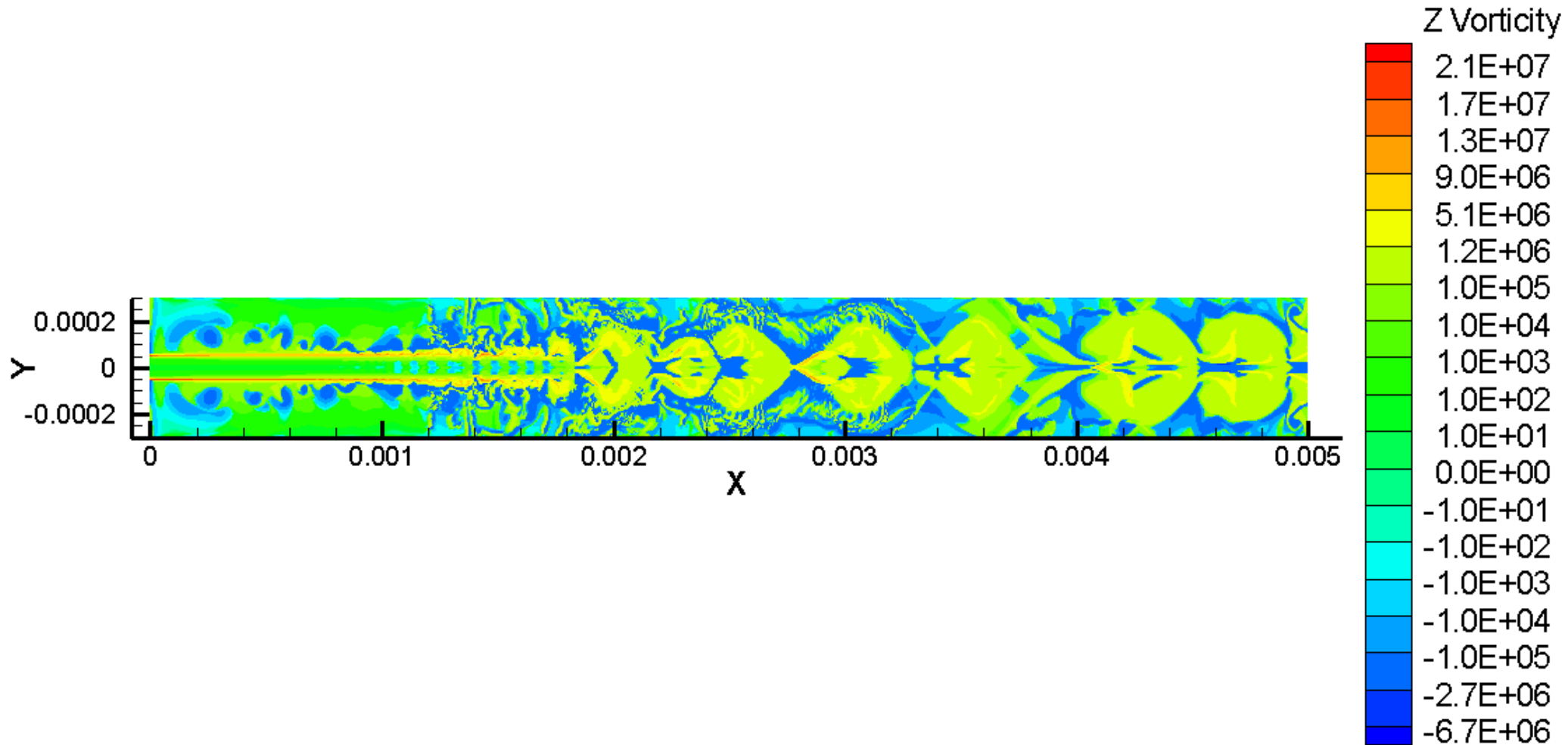
2D Simulation Of 3D Half-width Jet

- $t = 5.3 \text{ ms}$



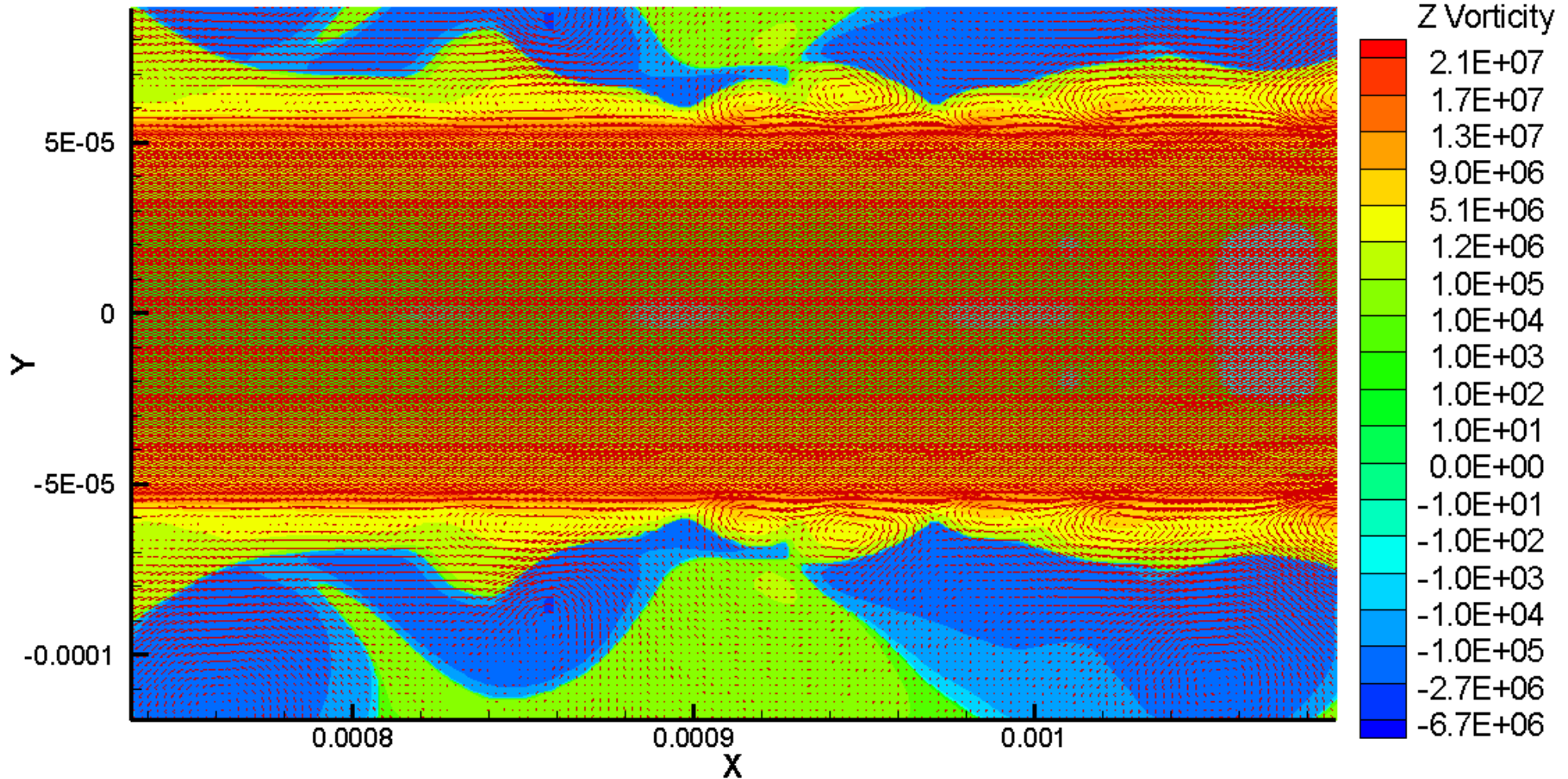
2D Simulation Of 3D Half-width Jet

- $t = 5.3 \text{ ms}$



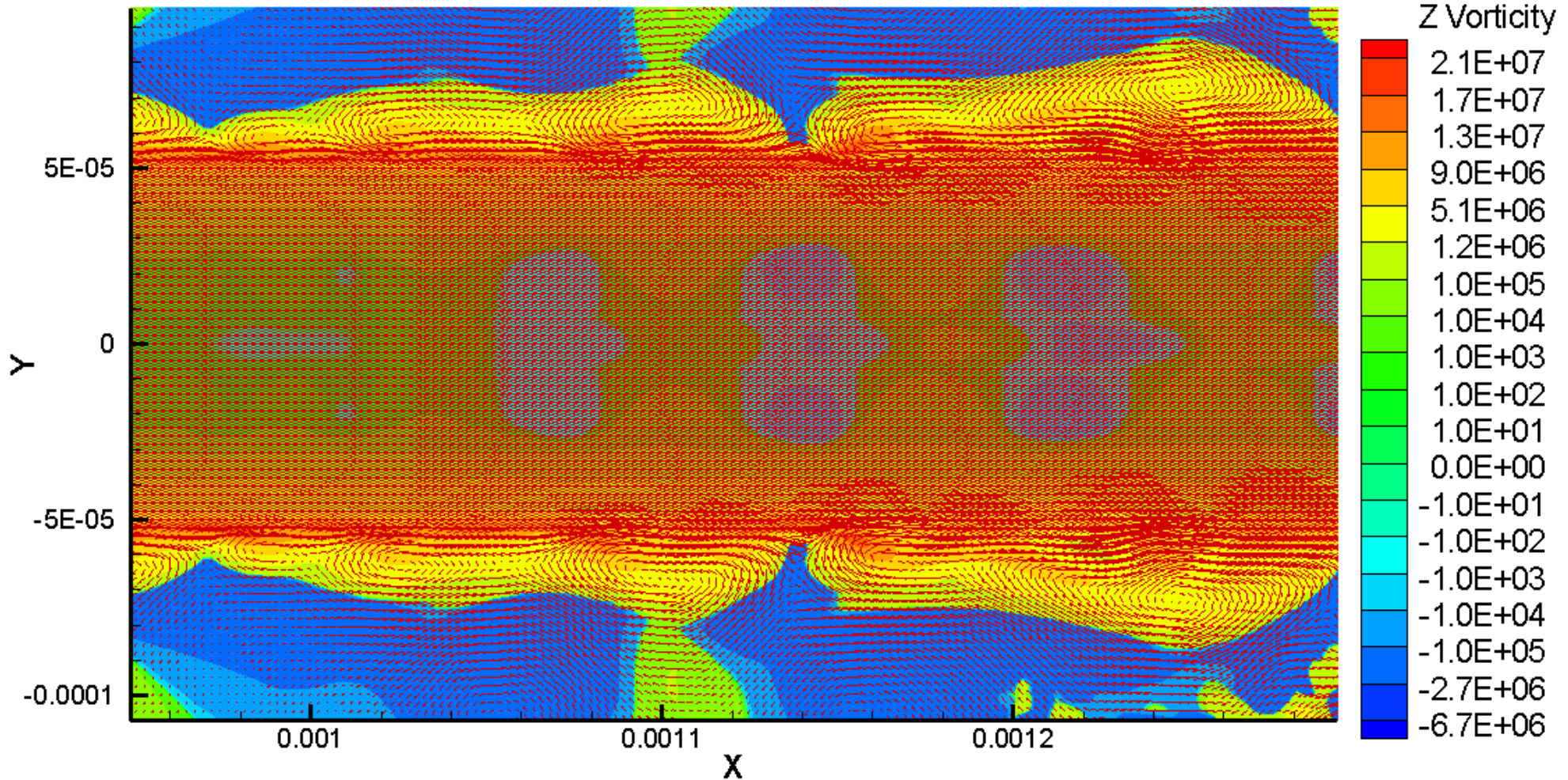
2D Simulation Of 3D Half-width Jet

- $t = 5.3 \text{ ms}$



2D Simulation Of 3D Half-width Jet

- $t = 5.3 \text{ ms}$



2D Simulation Of 3D Half-width Jet

- $t = 5.3 \text{ ms}$

