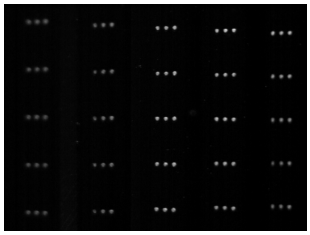
*

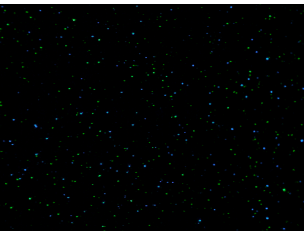
2.

Open-

FOAM

[htbp]





Table

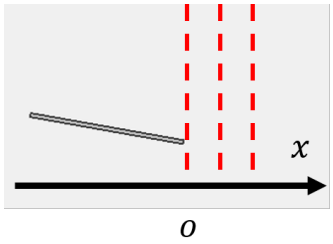
$x =$ 1

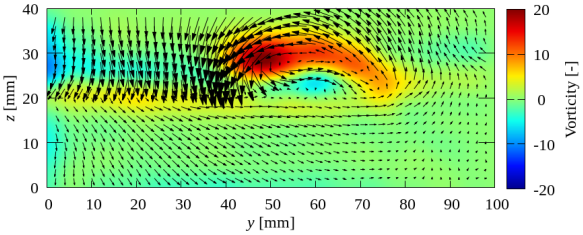
$0, 20, 40$

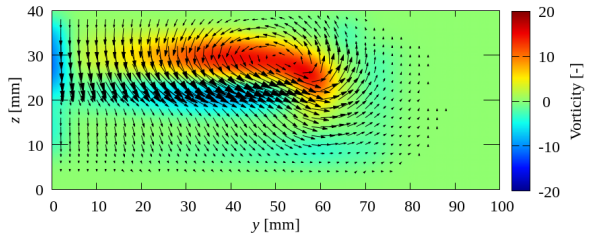
[htbp]

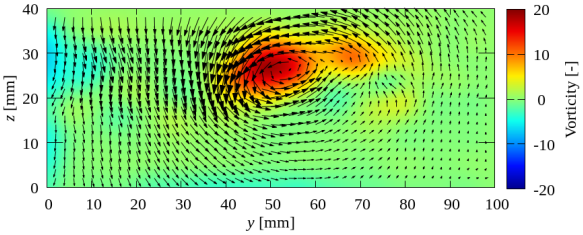
Application	OpenFOAM	
Solver	pimpleFoam	
Turbulence model	$k-\omega$ SST	
Time step	$1/800$	s
Simulation time	7.5	s

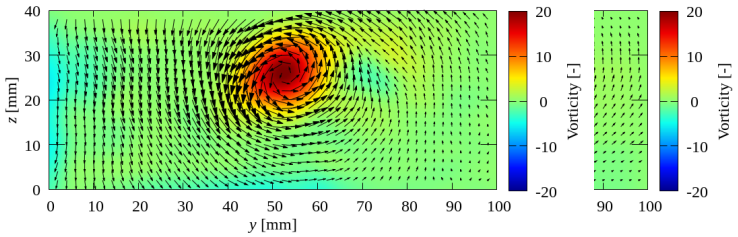
[htbp]

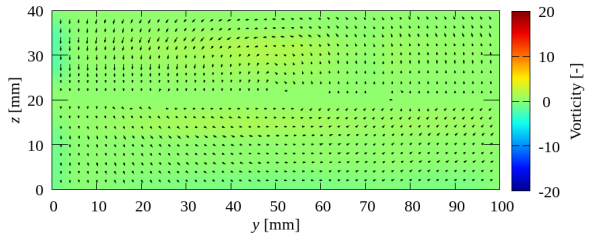

x
O


40
30
20
10
0
z [mm]
0
10
20
30
40
50
60
70
80
90
100
y [mm]
20
10
0
-10
-20
Vorticity [-]


40
30
20
10
0
z [mm]
0
10
20
30
40
50
60
70
80
90
100
y [mm]
20
10
0
-10
-20
Vorticity [-]


40
30
20
10
0
z [mm]
0
10
20
30
40
50
60
70
80
90
100
y [mm]
20
10
0
-10
-20
Vorticity [-]

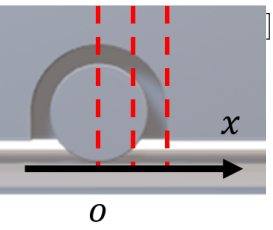

z [mm]
y [mm]
Vorticity [-]
Vorticity [-]
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
90
100
20
10
0
-10
-20
20
10
0
-10
-20


40
30
20
10
0
z [mm]
0
10
20
30
40
50
60
70
80
90
100
y [mm]
20
10
0
-10
-20
Vorticity [-]

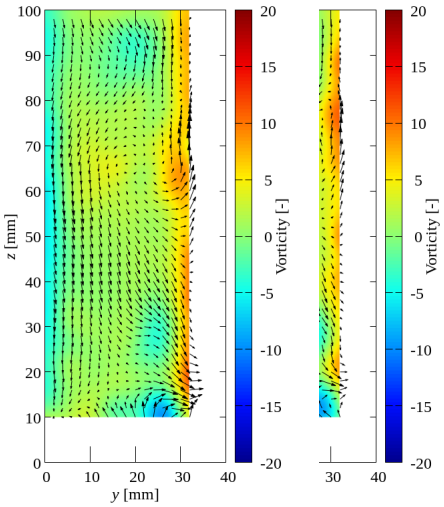
$0 \qquad x =$

$x =$ mm

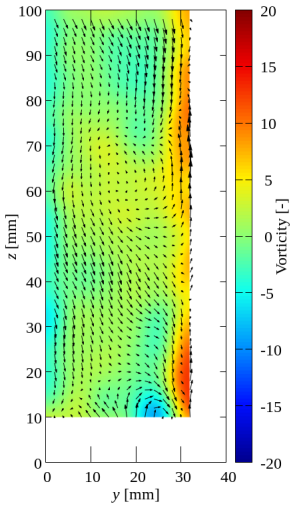
40 $20\ x =$


x
O

[htbp]


z [mm]
y [mm]
Vorticity [-]
Vorticity [-]

[htbp]


100
90
80
70
60
50
40
30
20
10
0
z [mm]
0
10
20
30
40
y [mm]
20
15
10
5
0
-5
-10
-15
-20
Vorticity [-]

1

50×

with rolling $x = 0\ 22254.7$
with rolling $x = 2023130.8$
with rolling $x = 4021027.3$
without rolling $x = 0\ 24264.7$
without rolling $x = 2024717.1$
without rolling $x = 4023543.5$