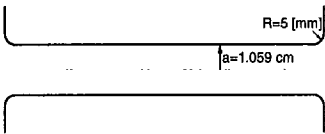
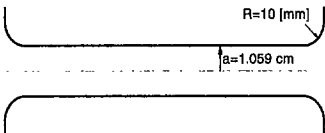


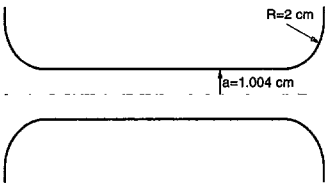
port A



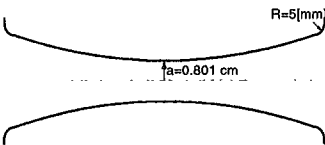
port B



port C



port D



port E

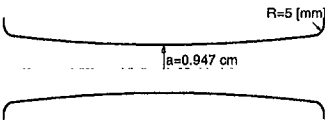


Figure 3: Port geometries.

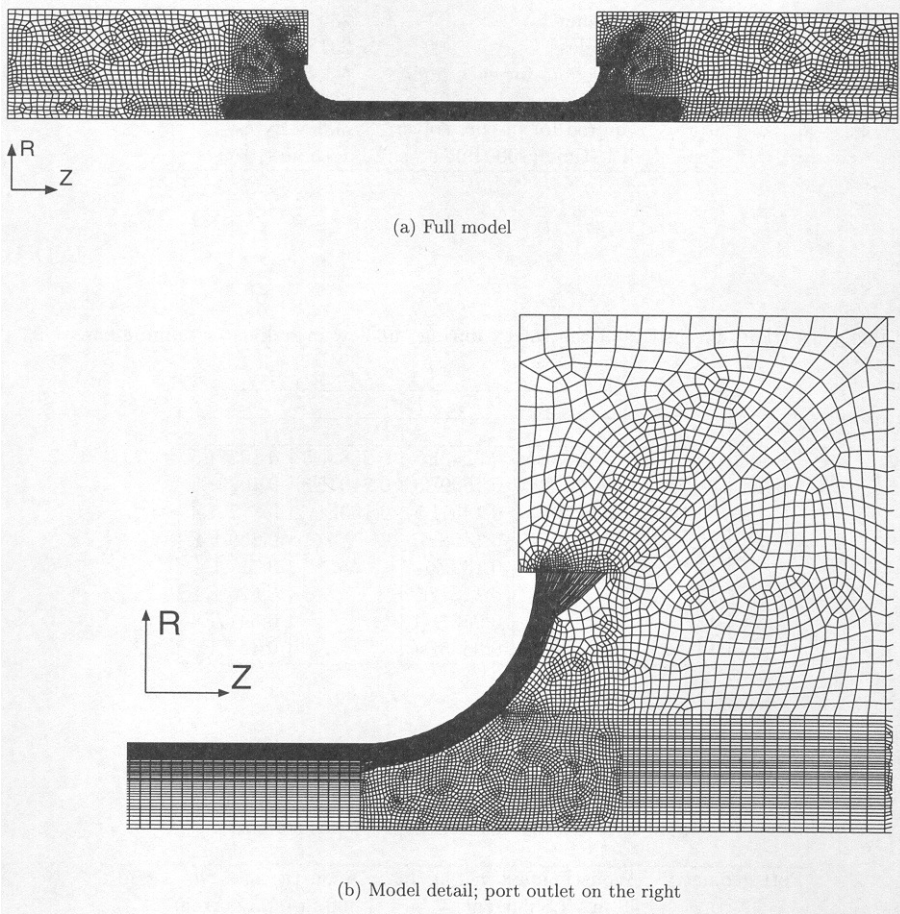


Figure 4: Numerical model for cylindrical port with a curvature radius of 2 cm (port C).

Table 3: Model statistics.

Geometry:	2D-axisymmetric
Number of elements:	23570
Number of nodes:	23180
Degrees of freedom for each node:	$U_r, U_z, P$
number of equations:	68370
Storage required for in-core solver:	300 MBytes
Typical CPU-time (100 time-steps):	13 hours

Table 4: Vorticity intensities of the vortex during out-flow in radians/s, volume flow = 2.22 l/s.

Time step, ms	Port			
	A	C	D	E
7	0.1558E5	0.2242E5	0.2883E5	0.1027E5
8	0.125 E5	0.1609E5	0.2104E5	0.1023E5
9	0.1279E5	0.1451E5	0.163E5	0.8776E4
10	0.1074E5	0.1458E5		0.839 E4
11		0.132E5		0.717 E4
12		0.1181E5		0.626 E4
13		0.9527E4		0.5417E4
14		0.8535E4		0.4481E4

Table 5: Measured acoustic mass of various ports.

Port geometry	Acoustic mass $m_a$ , kg/m <sup>4</sup> , 50 mA LS current	Acoustic mass $m_a$ , kg/m <sup>4</sup> , 800 mA LS current
0	278	275
A	305	297
C	309	283
E	324	<b>309</b>

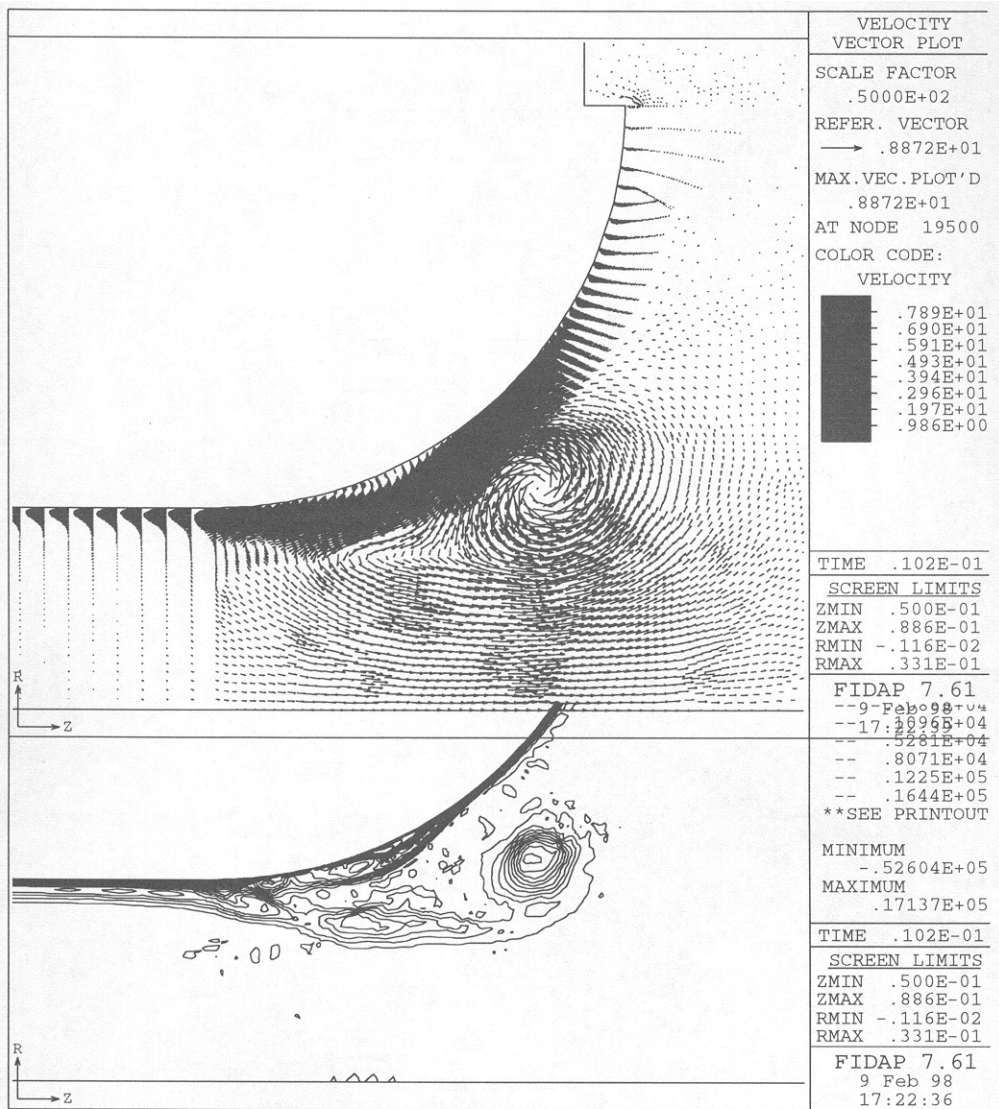


Figure 5: Velocity vectors and vorticity contours at the outlet of port C, 2.22 l/s, at time  $t=10.2$  ms (one cycle equals 20 ms).

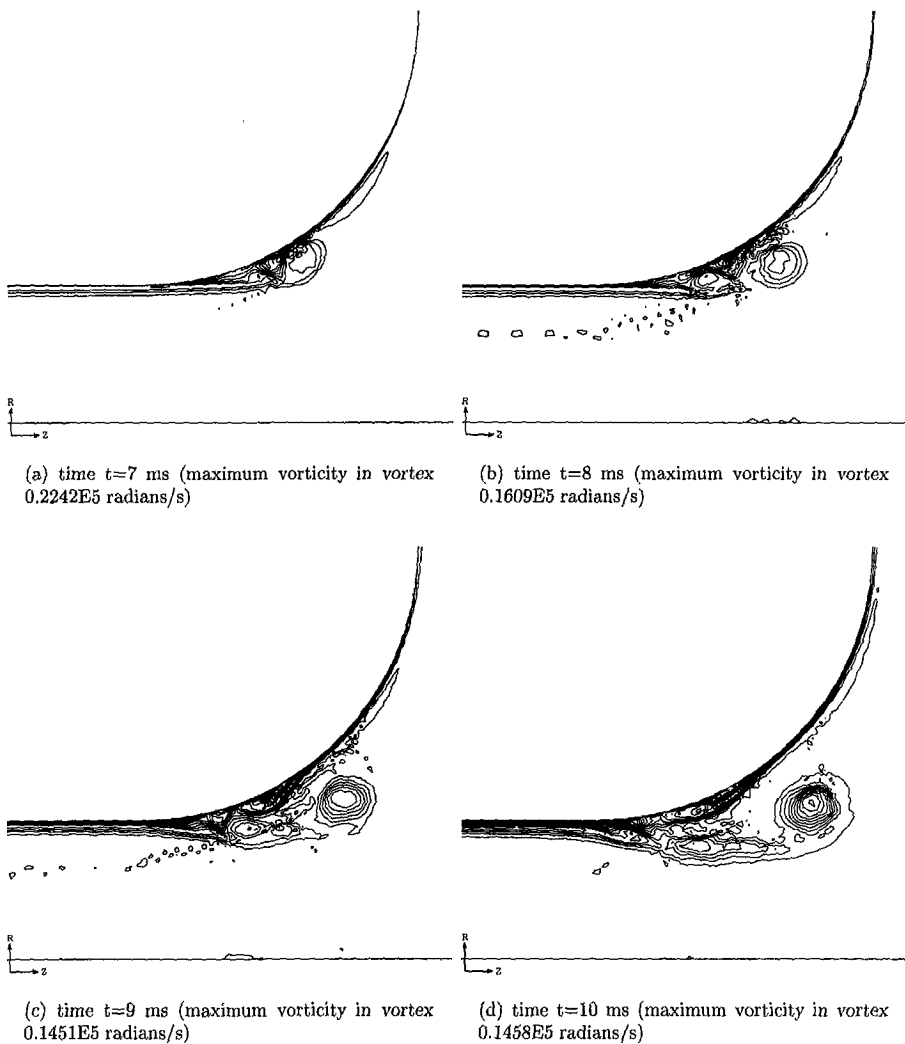
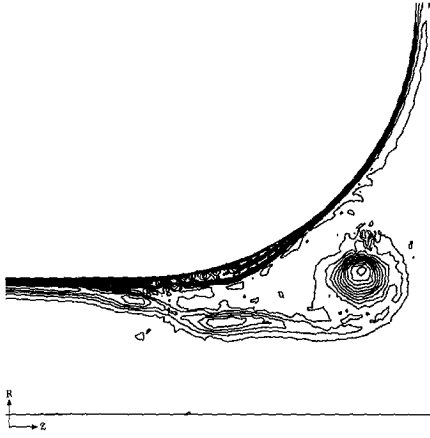
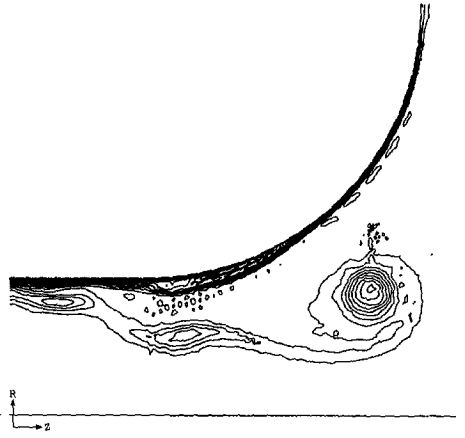


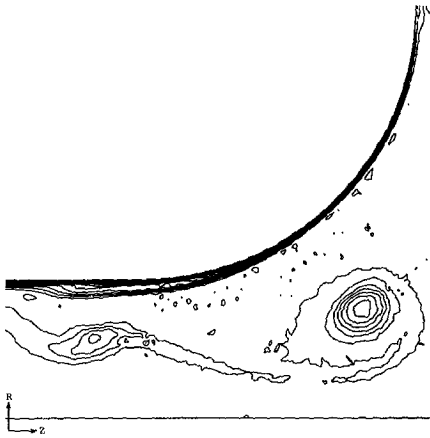
Figure 6: Vorticity contours at the outlet of port C, 2.22 l/s, time  $t=7..10$  ms.



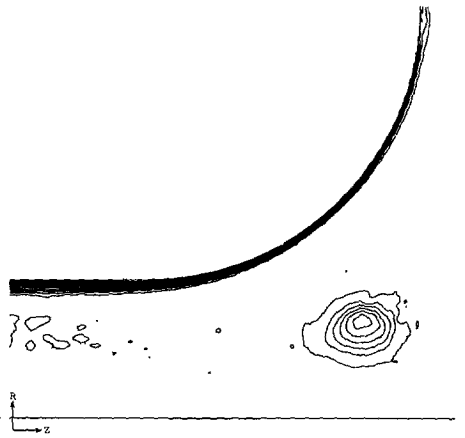
(a) time  $t=11$  ms (maximum vorticity in vortex  $0.132\text{E}5$  radians/s)



(b) time  $t=12$  ms (maximum vorticity in vortex  $0.1181\text{E}5$  radians/s)



(c) time  $t=13$  ms (maximum vorticity in vortex  $0.9527\text{E}4$  radians/s)



(d) time  $t=14$  ms (maximum vorticity in vortex  $0.8535\text{E}4$  radians/s)

Figure 7: Vorticity contours at the outlet of port C,  $2.22$  l/s, time  $t=11, 12, 13, 14$  ms,