2-D LID-DRIVEN SQUARE CAVITY FLOW BENCHMARK Re = 10000

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Table 1. Cavity vortex map

	ψ	ϖ	x	y
PV	-0.1223994	-1.919226	0.5119032	0.5300251
TL1	0.002630737	2.316843	0.07047716	0.9105952
BR1	0.003191565	3.786166	0.7750861	0.05927811
BR2	-0.0001404881	-0.306639	0.9351113	0.06782610
BR3	3.95681E-09	0.0023970	0.9959785	0.00402809
BR4	-1.1430E-13	-1.236E-05	0.9997783	0.00021835
BL1	0.001619673	2.159406	0.05881915	0.1622539
BL2	-1.13416E-06	-0.0323437	0.01720206	0.02033874
BL3	3.07141E-11	0.00023993	0.00111873	0.00111906

Table 2. Vertical velocity across various horizontal planes

x	y = 0.05	y = 0.1	y = 0.5	y = 0.9	y = 0.99
1.0000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
0.9950	-0.0007520	-0.0013405	-0.0829846	-0.5015821	-0.4774254
0.9900	-0.0013680	-0.0022523	-0.2098811	-0.6941639	-0.2504278
0.9800	-0.0022023	-0.0029832	-0.4739686	-0.4857455	-0.1057195
0.9700	-0.0025383	-0.0025348	-0.5813183	-0.3199069	-0.0521740
0.9688	-0.0025480	-0.0024158	-0.5821925	-0.3069014	-0.0481896
0.9609	-0.0024665	-0.0013440	-0.5529152	-0.2450378	-0.0291833
0.9531	-0.0021707	0.0001295	-0.5082766	-0.2112705	-0.0183973
0.9453	-0.0017057	0.0019298	-0.4779226	-0.1922896	-0.0120083
0.9063	0.0023965	0.0149480	-0.4280885	-0.1595615	-0.0029938
0.8594	0.0200619	0.0332326	-0.3706712	-0.1311482	-0.0023648
0.8047	0.0388724	-0.0135137	-0.3067016	-0.0991285	-0.0022309
0.6800	-0.0884138	-0.2239651	-0.1713387	-0.0440128	-0.0006105
0.5000	-0.0094226	-0.0136472	0.0087574	0.0254688	0.0041573
0.3500	0.0978252	0.1278186	0.1561575	0.1209308	0.0131534
0.2344	0.0187292	0.1886703	0.2728224	0.2597395	0.0075142
0.2266	0.0138269	0.1778601	0.2808689	0.2643878	0.0061368
0.1563	-0.0011023	0.0305609	0.3550228	0.1215199	0.0069951
0.0938	-0.0050162	-0.0022115	0.4262156	0.0231671	0.0176726
0.0781	-0.0060932	-0.0091578	0.4479107	0.0082378	0.0214880
0.0703	-0.0063057	-0.0128960	0.4576490	-0.0005799	0.0238583
0.0625	-0.0062175	-0.0163116	0.4639723	-0.0101954	0.0266805
0.0400	-0.0042212	-0.0196444	0.4359341	-0.0433983	0.0390514
0.0300	-0.0027901	-0.0165280	0.3931394	-0.0587099	0.0482866
0.0200	-0.0013904	-0.0111461	0.3300880	-0.0637935	0.0625560
0.0100	-0.0003503	-0.0050492	0.2132685	-0.0435060	0.0869182
0.0000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Table 3. Vorticity across various horizontal planes including the lid (Y=1)

x	y = 0.05	y = 0.1	y = 0.5	y = 0.9	y = 0.95	y = 1
1.0000	0.16416	0.31462	11.12615	118.2447	208.6591	-
0.9900	0.10868	0.13222	28.07720	3.45691	52.54831	-318.4463
0.9800	0.05223	-0.02797	20.30817	-22.97377	-37.75954	-185.7688
0.9700	-0.00396	-0.16546	1.00315	-11.42697	-21.64013	-126.6497
0.9688	-0.01057	-0.18042	-0.71893	-10.47659	-12.87952	-121.8753
0.9609	-0.05293	-0.27098	-6.54726	-5.88630	-12.17661	-98.21606
0.9531	-0.09244	-0.34803	-5.74328	-3.37967	-8.69272	-84.01949
0.9453	-0.12984	-0.41514	-3.46668	-2.06102	-6.57244	-75.23879
0.9063	-0.36733	-0.66006	-1.85203	-1.13084	-5.19755	-61.27403
0.8594	-1.18633	0.28884	-1.92082	-1.70416	-2.26655	-57.83551
0.8047	2.64155	2.83027	-1.91924	-1.92453	-1.11327	-54.17727
0.6800	8.89384	-1.70001	-1.91923	-1.93717	-1.22799	-46.05200
0.5000	-0.18860	-1.92239	-1.91923	-1.92621	-1.39683	-45.77868
0.3500	5.47794	-2.47792	-1.91923	-1.98834	-0.31583	-72.67888
0.2344	4.01290	5.37453	-1.91922	0.28707	5.48332	-119.1676
0.2266	3.18581	6.41661	-1.91921	0.97295	6.00703	-120.9635
0.1563	0.16639	3.53732	-1.91867	6.46951	5.12516	-128.7058
0.0938	-0.10048	0.67008	-2.08456	2.02141	3.41940	-157.2586
0.0781	-0.17037	0.57307	-2.08348	2.30514	3.24928	-171.5322
0.0703	-0.20325	0.46444	-1.79298	2.39008	3.20714	-180.5756
0.0625	-0.23035	0.29951	-1.14381	2.46133	3.19528	-191.4697
0.0400	-0.24528	-0.38070	2.80982	2.56850	3.35613	-241.4945
0.0300	-0.21313	-0.61715	4.76942	1.89146	3.50997	-282.3927
0.0200	-0.15770	-0.69910	7.67414	-0.35601	3.45164	-354.5629
0.0100	-0.08229	-0.61197	16.46753	-3.51595	0.32588	-532.9786
0.0000	0.00992	-0.40106	24.92334	-4.82674	-12.67382	-

Table 4. Horizontal velocity across various vertical planes

y	x = 0.05	x = 0.1	x = 0.5	x = 0.9	x = 0.95
1.0000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.9900	-0.0640060	0.0119673	0.5982661	0.5811133	0.5375302
0.9800	-0.1455478	-0.1744161	0.4930657	0.3726602	0.3141650
0.9766	-0.1422657	-0.1803539	0.4924652	0.3285655	0.2648360
0.9688	-0.1188602	-0.1562485	0.4992488	0.2595418	0.1835606
0.9609	-0.0903390	-0.1176006	0.5008962	0.2192676	0.1317979
0.9531	-0.0659772	-0.0839939	0.4960268	0.1960991	0.0992860
0.8516	0.0263654	0.0453567	0.3486291	0.1150957	0.0355113
0.7344	0.0495806	0.1846662	0.2074120	0.0517168	0.0151660
0.6172	0.0802560	0.0993144	0.0854519	-0.0010094	-0.0114353
0.5000	0.0122816	0.0068795	-0.0271995	-0.0666789	-0.0633441
0.4531	-0.0171210	-0.0296872	-0.0710427	-0.1005044	-0.1034102
0.2813	-0.0986033	-0.1987325	-0.2297588	-0.2534165	-0.0089840
0.1719	0.0002089	-0.0728729	-0.3304422	0.0081305	0.0097411
0.1016	0.0161053	0.0112654	-0.3946475	0.0150366	0.0034958
0.0703	0.0090558	0.0159880	-0.4369345	0.0069555	-0.0005707
0.0625	0.0074621	0.0154212	-0.4504339	0.0047027	-0.0012891
0.0547	0.0060515	0.0144418	-0.4586660	0.0025351	-0.0018563
0.0400	0.0038663	0.0118924	-0.4352275	-0.0009157	-0.0024712
0.0300	0.0026574	0.0097841	-0.3790613	-0.0024424	-0.0025040
0.0200	0.0016006	0.0072861	-0.2976238	-0.0029870	-0.0021610
0.0100	0.0006810	0.0041390	-0.1911936	-0.0022626	-0.0013605
0.0000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Table 5. Vorticity across various vertical planes including the right wall (X=1)

y	x = 0.05	x = 0.1	x = 0.5	x = 0.9	x = 0.95	x = 1
1.0000	-214.6428	-152.6943	-45.77868	-60.60862	-80.02621	-
0.9900	-24.61648	-42.16971	-25.11551	-28.67636	-31.11624	566.9151
0.9800	-0.37347	-4.46012	-1.35896	-14.63204	-17.85683	398.5799
0.9766	1.80623	0.21887	0.46450	-11.58175	-15.11657	364.5081
0.9688	3.79880	4.58306	0.52276	-6.75355	-10.75954	302.7834
0.9609	3.88425	4.77652	-0.45284	-3.95974	-8.09574	255.8447
0.9531	3.43617	3.89653	-1.18599	-2.42373	-6.44440	220.3830
0.8516	-0.18687	3.51167	-1.91923	-1.71658	-1.84669	95.95861
0.7344	8.40968	1.35904	-1.91923	-1.93413	-1.53624	74.99696
0.6172	3.32422	-2.08732	-1.91923	-1.93373	-2.10160	49.69959
0.5000	0.76536	-2.02213	-1.91923	-1.89790	-4.80981	11.12615
0.4531	0.75781	-2.03157	-1.91923	-1.81443	-6.06734	-0.12127
0.2813	6.53409	-0.71749	-1.91923	6.36352	3.42271	-1.84870
0.1719	2.43913	5.38143	-1.92051	1.27201	-0.26296	-0.47581
0.1016	-0.03029	0.72977	-1.90469	-0.65686	-0.38248	0.31271
0.0703	-0.31791	0.14379	-2.77326	-0.64945	-0.21927	0.25866
0.0625	-0.30201	0.04206	-2.48570	-0.58083	-0.17525	0.22501
0.0547	-0.27313	-0.03710	-1.35218	-0.49495	-0.13248	0.18768
0.0400	-0.20755	-0.13835	3.15778	-0.30457	-0.05619	0.11346
0.0300	-0.16550	-0.19346	6.46334	-0.16360	-0.00584	0.06503
0.0200	-0.12817	-0.26038	8.58224	-0.01556	0.04640	0.02430
0.0100	-0.09205	-0.35362	13.35969	0.14199	0.10366	0.00020
0.0000	-0.04808	-0.47458	25.15633	0.31005	0.16785	-

Table 6. Extrema of the velocity through the centerlines of the cavity

u_{min}	y_{min}	v_{max}	x_{max}	v_{min}	x_{min}
-0.4590699	0.0528089	0.4649179	0.0585941	-0.5821961	0.9688740

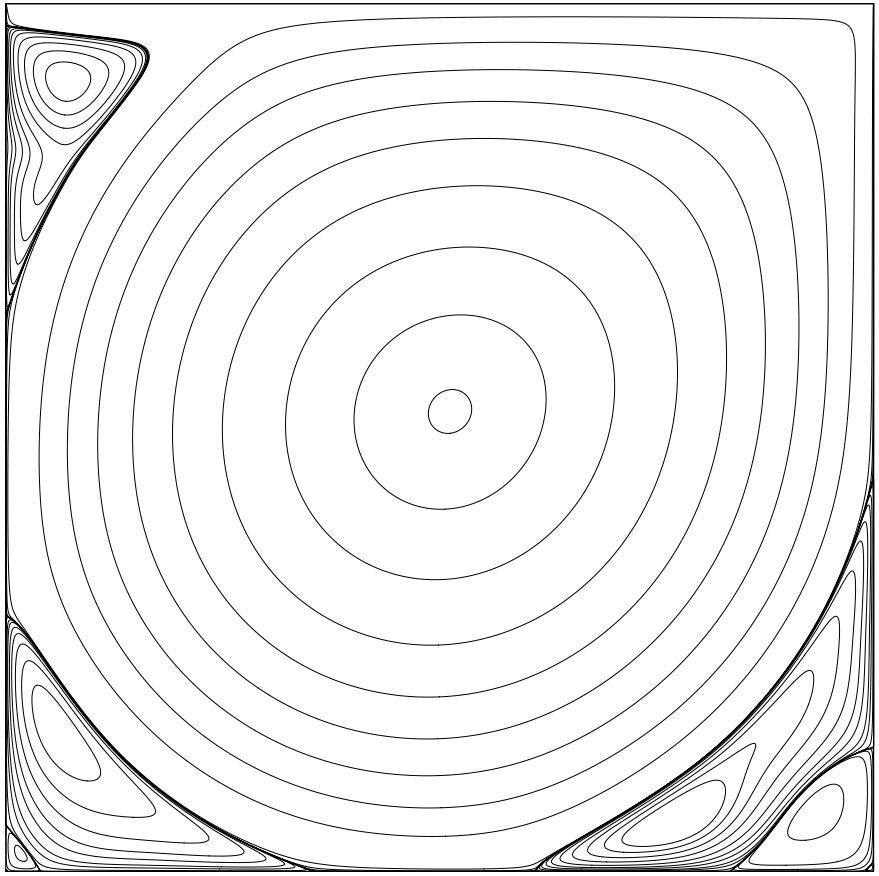

Figure 1. Streamlines, manual levels.

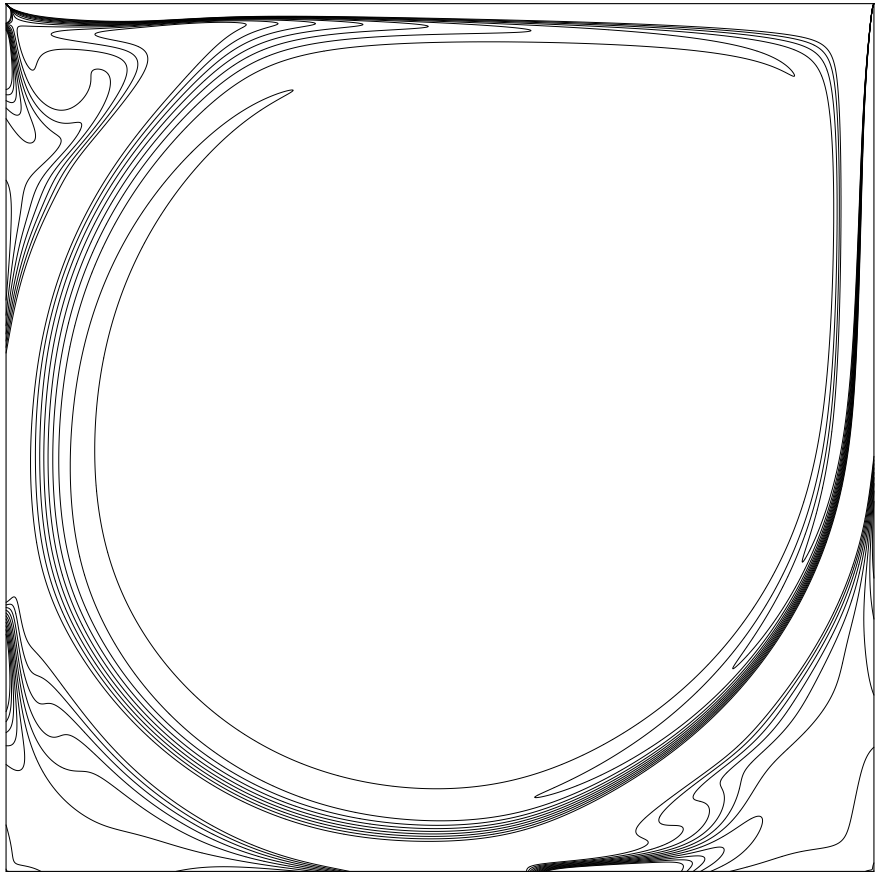

Figure 2. Vorticity contours, levels from -5 to 5 with step 1.