2-D LID-DRIVEN SQUARE CAVITY FLOW BENCHMARK Re = 25000

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Table 1. Cavity vortex map

	ψ	ϖ	x	y
PV	-0.1220731	-1.901866	0.5088852	0.5259507
TL1	0.004107789	2.587928	0.08270319	0.9122478
TL2	-0.0001316558	-1.223019	0.02913447	0.8152100
BR1	0.002632834	7.358424	0.7036098	0.03807760
BR2	-0.0005728859	-0.631486	0.9325776	0.1171728
BR3	9.54578E-08	0.00937777	0.9903600	0.01039428
BR4	-2.5718E-12	-6.934E-05	0.9994009	0.00059913
BL1	0.001577470	3.455071	0.04369369	0.1933892
BL2	-0.0001436112	-0.323441	0.06886452	0.05968064
BL3	4.46537E-09	0.0026824	0.00405383	0.00402977
BL4	-1.2876E-13	-1.387E-05	0.00022097	0.00022107

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	-0.0004384	-0.0030941	-0.1098170	-0.6259212	-0.4379771
0.9900	-0.0009914	-0.0059655	-0.3194057	-0.6042196	-0.2308790
0.9800	-0.0022518	-0.0102996	-0.5800985	-0.3183753	-0.0761942
0.9700	-0.0034057	-0.0119274	-0.5225912	-0.2335423	-0.0291007
0.9688	-0.0035212	-0.0119331	-0.5138215	-0.2293848	-0.0261446
0.9609	-0.0041036	-0.0111149	-0.4807490	-0.2151118	-0.0135449
0.9531	-0.0043337	-0.0092245	-0.4718870	-0.2106038	-0.0077832
0.9453	-0.0042164	-0.0067805	-0.4655960	-0.2074982	-0.0050486
0.9063	-0.0010477	0.0037073	-0.4198839	-0.1763699	-0.0030881
0.8594	0.0000931	0.0182551	-0.3648572	-0.1366897	-0.0035315
0.8047	0.0032469	0.0227626	-0.3030310	-0.1022904	-0.0031175
0.6800	-0.0686713	-0.2182293	-0.1710977	-0.0459225	-0.0006540
0.5000	-0.0217313	-0.0256351	0.0058167	0.0252263	0.0054857
0.3500	0.1166301	0.1184737	0.1509378	0.1294646	0.0201897
0.2344	0.0186319	0.2340454	0.2652815	0.2860610	0.0000587
0.2266	0.0114194	0.2348755	0.2731412	0.2909547	-0.0003625
0.1563	-0.0071585	0.0282231	0.3454045	0.0725401	0.0089436
0.0938	-0.0036472	-0.0160710	0.4134745	0.0148378	0.0140294
0.0781	-0.0006669	-0.0107258	0.4314095	-0.0045921	0.0160560
0.0703	0.0005119	-0.0077833	0.4406345	-0.0146534	0.0172540
0.0625	0.0014378	-0.0050229	0.4507228	-0.0249940	0.0185997
0.0400	0.0027085	0.0009129	0.4805958	-0.0571072	0.0235981
0.0300	0.0026791	0.0023463	0.4675269	-0.0753181	0.0267665
0.0200	0.0022886	0.0028383	0.4106658	-0.0958877	0.0314392
0.0100	0.0014510	0.0021439	0.2958783	-0.0781219	0.0394436
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	0.07323	0.63063	7.38833	169.9219	273.3864	-
0.9900	0.12705	0.54935	44.05974	-38.67410	-15.86432	-420.8046
0.9800	0.15628	0.32071	3.12388	-15.44143	-43.69902	-213.1859
0.9700	0.15600	0.00846	-8.52465	-3.78616	-16.14544	-140.9742
0.9688	0.15398	-0.02838	-7.70977	-3.15116	-6.87469	-136.2402
0.9609	0.13157	-0.24333	-2.69240	-0.95988	-6.26765	-115.7226
0.9531	0.09758	-0.39211	-1.42222	-0.53226	-3.57529	-106.0912
0.9453	0.05797	-0.47656	-1.61250	-0.70661	-2.17635	-101.3829
0.9063	-0.07304	-0.48073	-1.90260	-1.84234	-1.36717	-96.38306
0.8594	-0.12528	-1.50332	-1.90188	-1.92928	-0.47653	-92.97859
0.8047	-1.13599	4.62982	-1.90187	-1.90131	-1.15565	-86.62863
0.6800	10.82643	-3.43726	-1.90187	-1.90176	-1.95128	-73.55548
0.5000	-2.88160	-1.90566	-1.90187	-1.90204	-1.98142	-74.45204
0.3500	-0.35683	-1.86710	-1.90187	-1.89755	-1.75677	-122.8956
0.2344	5.85077	0.01110	-1.90187	-0.64501	10.74982	-183.7546
0.2266	4.00545	2.11563	-1.90187	0.50471	10.38588	-182.2560
0.1563	0.04555	4.99720	-1.90187	3.27430	2.28026	-195.8527
0.0938	-0.44779	-0.51390	-1.89775	2.58316	2.43886	-243.2819
0.0781	-0.34470	-0.74474	-1.88517	2.58281	2.46935	-264.5258
0.0703	-0.28403	-0.72443	-1.92898	2.58060	2.47963	-277.9770
0.0625	-0.22275	-0.64558	-2.06803	2.57244	2.49477	-294.1676
0.0400	-0.06764	-0.29922	-0.91181	2.69168	2.72977	-368.1251
0.0300	-0.01168	-0.14846	2.79075	3.13308	3.14237	-428.1082
0.0200	0.04335	-0.00581	7.59819	2.20055	3.93747	-532.7963
0.0100	0.10623	0.13898	17.99456	-5.99334	3.01380	-783.4912
0.0000	0.18302	0.29179	35.91123	-6.78022	-28.75590	-

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	-0.1423622	-0.1379446	0.5106613	0.4438628	0.4120004
0.9800	-0.1445579	-0.1803317	0.5157773	0.2691777	0.2062243
0.9766	-0.1282589	-0.1598825	0.5204181	0.2450263	0.1705450
0.9688	-0.0942542	-0.1164943	0.5195633	0.2186667	0.1201349
0.9609	-0.0705810	-0.0900183	0.5092669	0.2105184	0.0941960
0.9531	-0.0543029	-0.0729472	0.4960493	0.2073587	0.0811696
0.8516	0.0637236	0.0637405	0.3474206	0.1237829	0.0537641
0.7344	0.0389254	0.2125642	0.2093007	0.0575379	0.0230444
0.6172	0.1036542	0.1074585	0.0887028	0.0032636	-0.0061041
0.5000	0.0172075	0.0120819	-0.0234701	-0.0657983	-0.0601802
0.4531	-0.0131999	-0.0247745	-0.0671979	-0.1016802	-0.0959930
0.2813	-0.1398679	-0.1930585	-0.2251661	-0.2788614	-0.0009487
0.1719	0.0200099	-0.0873071	-0.3242311	0.0273424	0.0116774
0.1016	0.0037714	0.0160169	-0.3866699	0.0018019	-0.0053619
0.0703	-0.0000199	0.0082091	-0.4135633	-0.0059002	-0.0065225
0.0625	-0.0007037	0.0060201	-0.4202307	-0.0068265	-0.0060337
0.0547	-0.0013861	0.0038789	-0.4292587	-0.0073489	-0.0053862
0.0400	-0.0024696	0.0000410	-0.4581993	-0.0073099	-0.0040191
0.0300	-0.0027920	-0.0021389	-0.4588535	-0.0065830	-0.0031067
0.0200	-0.0025401	-0.0033933	-0.3915989	-0.0052497	-0.0021987
0.0100	-0.0015995	-0.0029607	-0.2601293	-0.0031384	-0.0011974
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	-328.5124	-236.4668	-74.45204	-96.07461	-103.8161	-
0.9900	-11.14672	-24.23604	-9.24651	-29.77472	-32.82176	894.1415
0.9800	4.67892	5.36636	1.78891	-8.78803	-12.96741	600.7885
0.9766	5.10136	6.32793	0.70903	-5.55891	-9.79201	534.1679
0.9688	4.12097	4.53253	-1.04842	-1.74472	-5.51248	419.5534
0.9609	3.07648	2.75064	-1.81224	-0.53987	-3.33330	341.8069
0.9531	2.63122	2.37985	-1.98358	-0.44800	-2.13320	289.4586
0.8516	0.01864	0.77103	-1.90187	-1.92490	-1.09966	148.3754
0.7344	10.63144	-0.85896	-1.90187	-1.90062	-1.70070	119.0687
0.6172	0.68315	-1.88819	-1.90187	-1.90133	-1.74112	78.39117
0.5000	-2.18202	-1.90160	-1.90187	-1.90124	-1.44791	7.38833
0.4531	-2.23920	-1.90169	-1.90187	-1.90456	-2.01737	-6.14797
0.2813	9.23439	-2.19523	-1.90187	-2.26970	1.60965	-1.59429
0.1719	3.17948	9.78888	-1.90187	0.31990	-0.90859	1.83055
0.1016	-0.48841	-0.24691	-1.90554	-0.52806	-0.45397	0.66174
0.0703	-0.20297	-0.56640	-1.81674	-0.23799	-0.04388	0.21225
0.0625	-0.17701	-0.53714	-1.93835	-0.17599	0.02257	0.14777
0.0547	-0.15007	-0.49957	-2.43209	-0.11410	0.06606	0.09763
0.0400	-0.08015	-0.40507	-2.87174	-0.00394	0.09733	0.03314
0.0300	-0.01451	-0.29504	1.80269	0.06903	0.09853	0.00648
0.0200	0.05953	-0.11769	9.94540	0.15161	0.10002	-0.00739
0.0100	0.13024	0.13583	14.71606	0.25317	0.11104	-0.00700
0.0000	0.18891	0.45087	45.64850	0.37369	0.13077	-

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

u_{min}	y_{min}	v_{max}	x_{max}	v_{min}	x_{min}
-0.4644101	0.0343497	0.4807876	0.0387827	-0.5821426	0.9788956

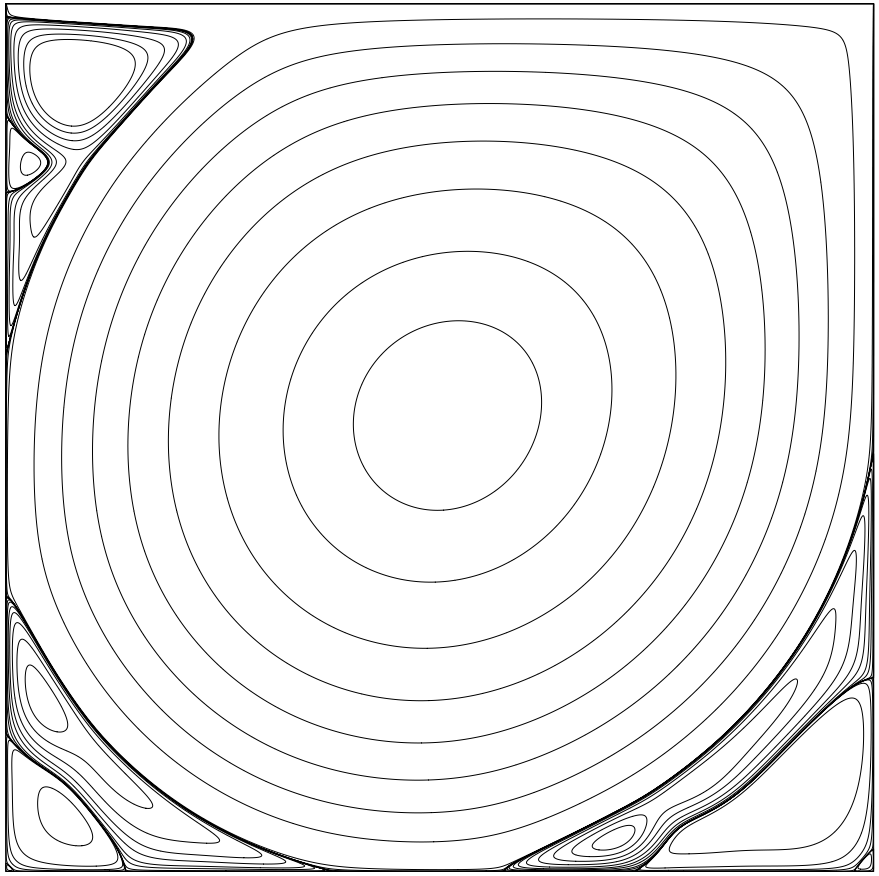

Figure 1. Streamlines, manual levels.

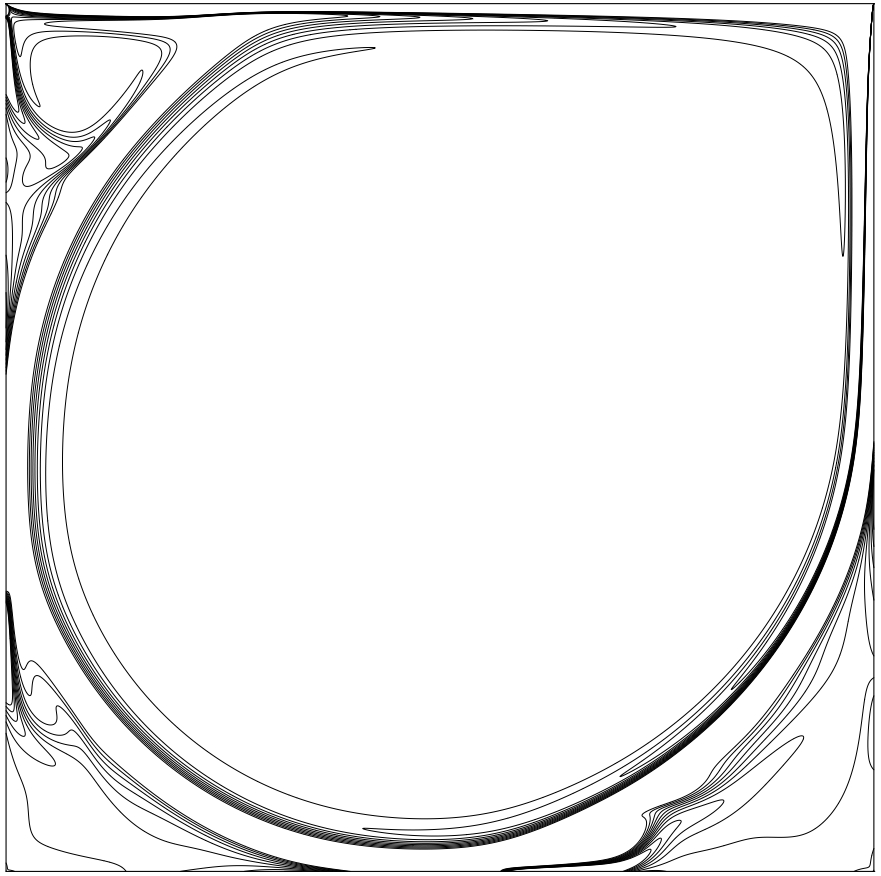

Figure 2. Vorticity contours, levels from -5 to 5 with step 1.