2-D LID-DRIVEN SQUARE CAVITY FLOW BENCHMARK Re = 5000

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Table 1. Cavity vortex map

	ψ	ϖ	x	y
PV	-0.1222259	-1.940636	0.5150938	0.5352620
TL1	0.001447832	2.091562	0.06335432	0.9092568
BR1	0.003073751	2.752178	0.8046258	0.07274724
BR2	-1.42879E-06	-0.0349262	0.9783737	0.01877709
BR3	3.88692E-11	0.00026140	0.9987910	0.00120879
BL1	0.001376675	1.518861	0.07285072	0.1370630
BL2	-6.66764E-08	-0.0104267	0.00784994	0.00799609
BL3	1.7523E-12	8.136E-05	0.00048300	0.00048300

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	0.0002057	0.0022912	-0.0638482	-0.4140033	-0.5427644
0.9900	0.0005255	0.0043659	-0.1491286	-0.6577405	-0.2606320
0.9800	0.0013724	0.0079682	-0.3477348	-0.6186165	-0.1108247
0.9700	0.0023713	0.0110419	-0.5076147	-0.4365877	-0.0619132
0.9688	0.0024980	0.0113867	-0.5208281	-0.4192368	-0.0581509
0.9609	0.0033674	0.0135769	-0.5716794	-0.3271998	-0.0393061
0.9531	0.0042946	0.0156579	-0.5702858	-0.2652484	-0.0273873
0.9453	0.0053117	0.0177043	-0.5409807	-0.2229157	-0.0194425
0.9063	0.0125123	0.0262347	-0.4303251	-0.1416741	-0.0046934
0.8594	0.0235294	0.0183335	-0.3765553	-0.1158262	-0.0021015
0.8047	0.0156060	-0.0324137	-0.3104429	-0.0920321	-0.0017161
0.6800	-0.0772865	-0.2014400	-0.1717351	-0.0413321	-0.0006373
0.5000	-0.0037731	-0.0069629	0.0117326	0.0273577	0.0029483
0.3500	0.0713474	0.1335613	0.1617713	0.1185757	0.0092154
0.2344	0.0186611	0.1381348	0.2811246	0.2273915	0.0091388
0.2266	0.0152649	0.1281563	0.2893833	0.2310182	0.0085688
0.1563	0.0013408	0.0331465	0.3653572	0.1595557	0.0064569
0.0938	-0.0039892	-0.0005180	0.4408754	0.0284227	0.0171909
0.0781	-0.0060062	-0.0081810	0.4474085	0.0125534	0.0223757
0.0703	-0.0068033	-0.0119901	0.4437791	0.0053276	0.0256649
0.0625	-0.0073447	-0.0154812	0.4343553	-0.0021707	0.0296562
0.0400	-0.0068780	-0.0205904	0.3733017	-0.0258150	0.0483200
0.0300	-0.0056281	-0.0190321	0.3299684	-0.0338328	0.0635143
0.0200	-0.0038869	-0.0147510	0.2656992	-0.0347675	0.0887577
0.0100	-0.0019038	-0.0081488	0.1584850	-0.0239322	0.1326165
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	-0.02664	-0.48113	10.32138	94.08389	164.5439	-
0.9900	-0.08239	-0.39296	18.73908	27.33555	71.33384	-259.6378
0.9800	-0.12657	-0.32299	19.33161	-19.84854	-15.48533	-156.2791
0.9700	-0.16790	-0.27415	11.36932	-15.21461	-23.09050	-112.2758
0.9688	-0.17297	-0.26951	10.12054	-14.38913	-15.68747	-108.4981
0.9609	-0.20788	-0.24341	2.20299	-9.98453	-15.09871	-88.56649
0.9531	-0.24583	-0.22093	-3.14414	-7.03781	-12.00901	-75.01109
0.9453	-0.28759	-0.19509	-5.22821	-5.03548	-9.90230	-65.49823
0.9063	-0.49355	0.19840	-1.81837	-1.57812	-8.40222	-46.04187
0.8594	-0.01238	1.34061	-1.92500	-1.30104	-4.89364	-40.84333
0.8047	2.37306	3.26150	-1.94232	-1.59251	-3.19578	-37.95760
0.6800	6.40306	2.12667	-1.94064	-1.91186	-0.87921	-32.41023
0.5000	3.28270	-2.56152	-1.94064	-1.97275	-0.52943	-31.98739
0.3500	5.86080	-1.02746	-1.94064	-1.80304	0.48950	-49.46703
0.2344	2.99956	5.28164	-1.94104	0.68195	3.36999	-81.22051
0.2266	2.55389	5.51315	-1.94068	1.08412	3.62983	-83.24024
0.1563	0.32190	2.71098	-1.95932	4.97025	4.80194	-96.10921
0.0938	0.05569	0.85254	-1.60886	2.19450	3.96155	-114.7531
0.0781	-0.00116	0.71069	-0.57263	1.83994	3.69877	-124.9950
0.0703	-0.03685	0.61337	0.16162	1.79790	3.57614	-131.6668
0.0625	-0.07578	0.48464	0.98947	1.79762	3.46299	-139.8038
0.0400	-0.18152	-0.06796	3.33781	1.47023	3.19687	-177.7618
0.0300	-0.21045	-0.34899	4.76158	0.79397	3.02777	-209.2107
0.0200	-0.22008	-0.59265	8.02973	-0.36443	2.44848	-265.6801
0.0100	-0.20793	-0.76481	13.35891	-1.76555	0.53450	-410.9614
0.0000	-0.17496	-0.86421	18.01849	-2.98390	-3.61013	-

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	0.0273309	0.1560958	0.6903122	0.6697015	0.5979519
0.9800	-0.1246305	-0.1195550	0.5203902	0.4704223	0.3888009
0.9766	-0.1334461	-0.1498767	0.4970314	0.4208390	0.3373425
0.9688	-0.1281993	-0.1641121	0.4782887	0.3323025	0.2453972
0.9609	-0.1076267	-0.1426547	0.4779338	0.2697054	0.1799802
0.9531	-0.0840446	-0.1128269	0.4785260	0.2264942	0.1344832
0.8516	0.0103385	0.0571826	0.3484721	0.0977755	0.0193523
0.7344	0.0468833	0.1527503	0.2046243	0.0434957	0.0040871
0.6172	0.0607115	0.0907641	0.0812570	-0.0073773	-0.0219388
0.5000	0.0076043	0.0025599	-0.0320887	-0.0703297	-0.0775454
0.4531	-0.0173757	-0.0343150	-0.0761570	-0.1026277	-0.1098765
0.2813	-0.0734644	-0.1748460	-0.2361352	-0.2045994	-0.0149437
0.1719	-0.0057944	-0.0667919	-0.3383315	-0.0084999	0.0024873
0.1016	0.0118381	0.0063270	-0.4170278	0.0137314	0.0073003
0.0703	0.0099466	0.0153124	-0.4462004	0.0228718	0.0072971
0.0625	0.0091689	0.0159396	-0.4368267	0.0232275	0.0066721
0.0547	0.0083472	0.0160358	-0.4168814	0.0224647	0.0058229
0.0400	0.0066888	0.0148552	-0.3521887	0.0180783	0.0038134
0.0300	0.0054148	0.0129815	-0.2936295	0.0134521	0.0023685
0.0200	0.0039224	0.0100658	-0.2250587	0.0083299	0.0010987
0.0100	0.0021258	0.0058476	-0.1331624	0.0035731	0.0002307
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	-157.3042	-111.6003	-31.98739	-44.86900	-70.82921	-
0.9900	-36.70882	-49.96794	-25.79305	-25.01201	-27.63940	415.5812
0.9800	-4.86098	-12.41956	-8.99088	-15.96958	-18.76864	286.3695
0.9766	-1.76424	-6.40794	-5.15465	-13.76911	-16.84263	263.5068
0.9688	1.77456	1.12816	-0.77184	-9.82488	-13.53559	224.4540
0.9609	3.03533	3.66026	0.01193	-7.04407	-11.26713	195.2345
0.9531	3.31802	4.10722	-0.33206	-5.16293	-9.72303	172.3863
0.8516	0.51306	4.37140	-1.94226	-1.34063	-5.48788	71.50702
0.7344	6.26463	2.11191	-1.94064	-1.67775	-5.39707	52.57413
0.6172	3.85933	-1.13665	-1.94064	-1.73584	-6.08844	34.64043
0.5000	2.33682	-1.84468	-1.94064	-1.72773	-4.33421	10.32138
0.4531	2.42709	-1.84125	-1.94064	-2.02161	0.41272	2.54897
0.2813	4.36684	1.77677	-1.94056	8.66087	3.62551	-1.93258
0.1719	2.04989	3.68556	-1.90978	1.38677	-0.03642	-0.99385
0.1016	0.23109	0.94449	-2.56077	0.33953	-0.20690	-0.49796
0.0703	-0.08614	0.35151	-0.36147	-0.15826	-0.27352	-0.17438
0.0625	-0.11511	0.23715	0.98406	-0.30498	-0.27596	-0.10813
0.0547	-0.13212	0.13241	2.44021	-0.43765	-0.26996	-0.05333
0.0400	-0.14827	-0.05158	4.77427	-0.60160	-0.23383	0.01305
0.0300	-0.15905	-0.18033	5.82836	-0.62284	-0.19089	0.02947
0.0200	-0.17625	-0.32399	7.39879	-0.56658	-0.13421	0.02549
0.0100	-0.20058	-0.48951	10.98697	-0.44430	-0.06480	0.00901
0.0000	-0.22695	-0.67811	15.55829	-0.27395	0.01672	-

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

u_{min}	y_{min}	v_{max}	x_{max}	v_{min}	x_{min}
-0.4473136	0.0742967	0.4475084	0.0796881	-0.5761359	0.9574605

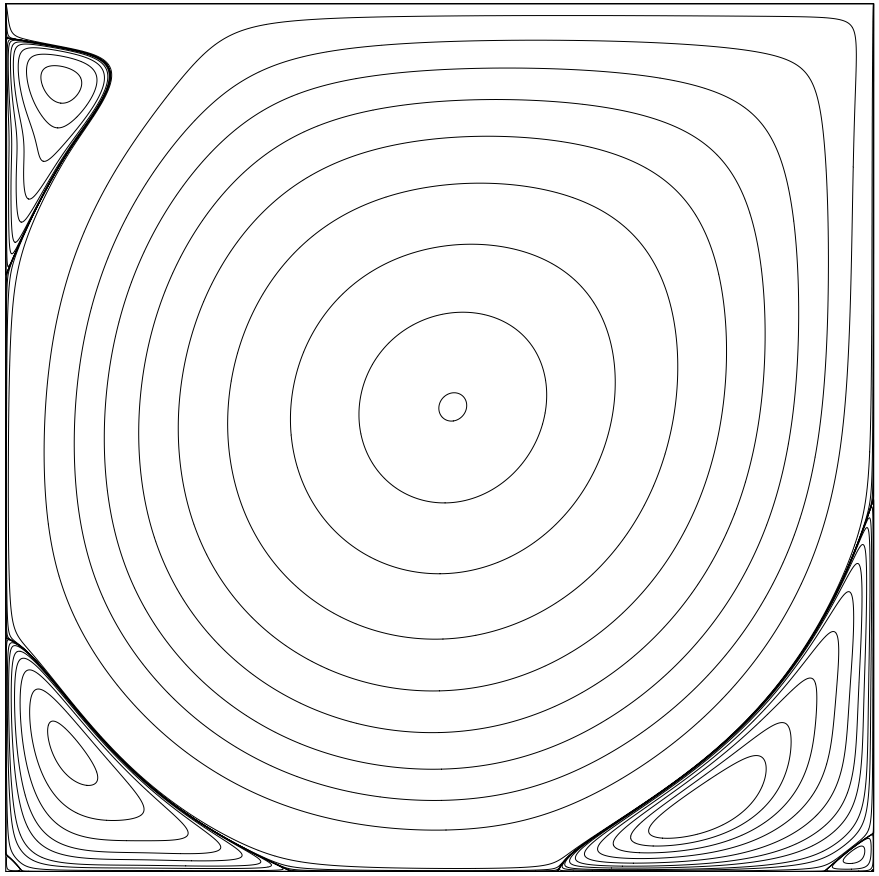

Figure 1. Streamlines, manual levels.

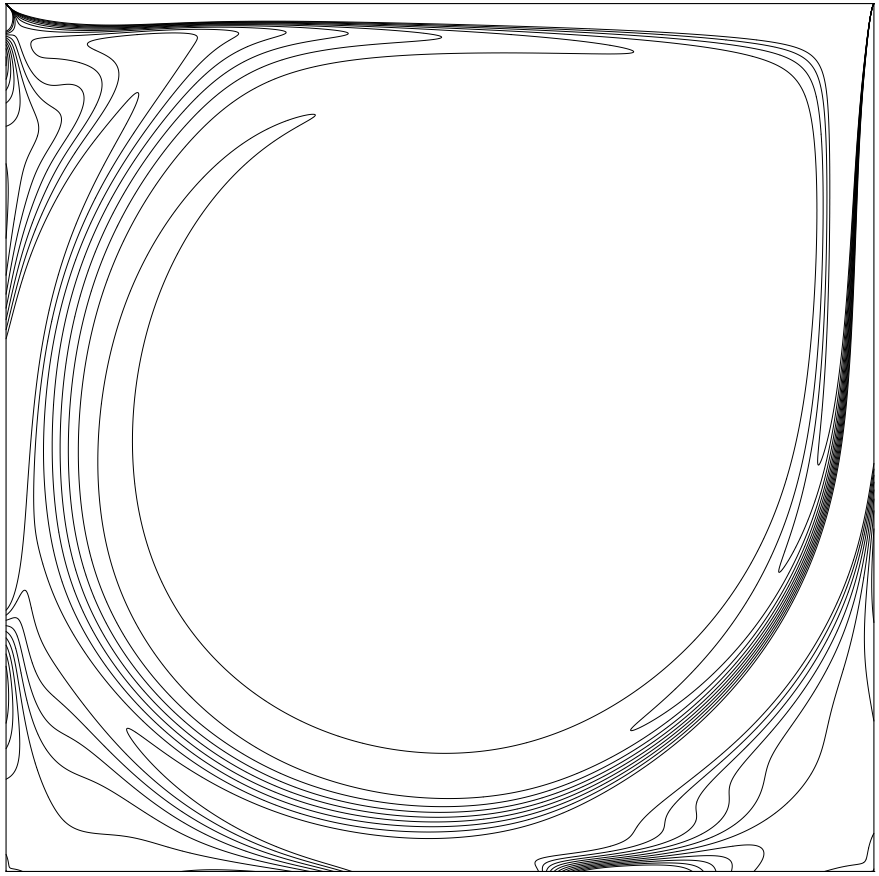

Figure 2. Vorticity contours, levels from -5 to 5 with step 1.