Appendix C

PISCES-MP Adaptive Linear Solver Results

This appendix lists the overall runtimes of the PISCES-MP linear solver presented in Chapter 5. Memory consumption and total time are given for each direct/iterative breakdown. In addition, the time spent performing the partial factorization, computing matrix-vector products, and performing orthogonalizations are also given. These three components consume the bulk of the time within the direct iterative solver. All timings were performed on an IBM SP2 with RS6000/590 processors.

Table C.1 IBM RS6000/590 (serial) direct/iterative solver results.

	Factor Time	Ap Time	Ortho Time	Total Time	Memory
100% Iter	0.00s	60.22s	23.87s	88.55s	2,006k
75% Iter	1.61s	51.87s	18.18s	75.01s	3,141k
50% Iter	4.08s	44.26s	12.38s	62.87s	4,714k
25% Iter	7.39s	33.49s	4.14s	46.47s	7,186k
10% Iter	9.71s	9.07s	0.55s	20.09s	8,471k
Full Direct	14.21s	0.00s	0.00s	15.00s	9,391k

Table C.2 Fully iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
1PE	0s	60.22s	23.87s	88.55s	2,006k
2PE	0s	30.61s	13.79s	46.75s	1,017k
4PE	0s	15.68s	6.09s	23.12s	524k
8PE	0s	8.15s	4.46s	13.89s	277k
16PE	0s	4.58s	4.30s	10.11s	153k
32PE	0s	2.52s	4.70s	9.26s	89k

Table C.3 75% iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
1PE	1.61s	51.87s	18.18s	75.01s	3,141k
2PE	0.74s	27.96s	9.25s	39.75s	1,586k
4PE	0.34s	16.14s	4.89s	22.33s	758k
8PE	0.18s	9.07s	4.00s	14.35s	406k
16PE	0.09s	5.16s	4.08s	10.55s	278k
32PE	0.06s	3.11s	4.56s	9.61s	175k

Table C.4 50% iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
1PE	4.08s	44.26s	12.38s	62.87s	4,714k
2PE	2.42s	25.80s	5.24s	34.75s	2,554k
4PE	1.09s	17.05s	3.57s	22.97s	1,367k
8PE	0.55s	9.92s	3.48s	14.96s	772k
16PE	0.26s	6.17s	3.66s	11.39s	551k
32PE	0.24s	4.05s	4.35s	10.47s	496k

Table C.5 25% iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
1PE	7.39s	33.49s	4.14s	46.47s	7,186k
2PE	4.41s	20.89s	2.92s	29.17s	4,102k
4PE	1.90s	19.34s	2.65s	24.65s	2,008k
8PE	1.03s	10.09s	2.82s	14.84s	1,591k
16PE	1.48s	0.29s	0.10s	2.27s	1,877k
32PE	2.36s	0.31s	0.08s	2.90s	2,298k

Table C.6 1-level shared iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
2PE	8.32s	0.48s	0.12s	9.24s	6,117k
4PE	6.33s	0.35s	0.10s	6.94s	3,983k
8PE	3.70s	0.34s	0.09s	4.19s	2,966k
16PE	2.68s	0.34s	0.08s	3.32s	2,529k
32PE	2.36s	0.31s	0.08s	2.90s	2,298s

Table C.7 2-level shared iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
4PE	5.37s	1.09s	0.11s	6.26s	3,788k
8PE	2.96s	0.62s	0.09s	3.88s	2,771k
16PE	2.03s	0.35s	0.09s	2.76s	2,334k
32PE	1.38s	0.28s	0.08s	2.13s	2,102k

Table C.8 3-level shared iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
8PE	2.34s	0.54s	0.12s	3.30s	2,395k
16PE	1.48s	0.29s	0.10s	2.27s	1,877k
32PE	0.95s	0.23s	0.06s	1.62s	1,647k

Table C.9 4-level shared iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
16PE	1.10s	0.23s	0.05s	1.73s	1,550k
32PE	0.65s	0.18s	0.05s	0.98s	1,168k

Table C.10 5-level shared iterative results.

	Direct Time	Ap Time	Ortho Time	Total Time	Memory/PE
32PE	0.44s	0.08s	0.03s	0.64s	699k

Table C.11 Fully direct results.

	Direct Time	Solve Time	Total Time	Memory/PE
1PE	14.21s	0.79s	15.00s	9,390K
2PE	8.48s	0.43s	8.91s	6,117K
4PE	6.52s	0.27s	6.79s	3,983K
8PE	3.97s	0.17s	4.14s	2,966K
16PE	3.05s	0.13s	3.18s	2,529K
32PE	2.94s	0.11s	3.05s	2,298K