A   Comprehensive Computational Results

Tables 1, 2, 3, and 4 present exhaustive computational results for large (those requiring ≥ 1 hour of run time), medium (those requiring between 1 hour and 1 minute of run time), small (those requiring between 1 minute and 0.1 seconds of run time) and tiny (those requiring less than 0.1 seconds) instances, respectively. In each table, the first five columns give the name (or index from SJ database), dimension, number of nonzeros, MATLAB estimated condition number, and MATLAB estimated sparse norm in each matrix. Column 6 gives the run time of SPEX Left LU using the selected pivoting scheme tol 0. Lastly, columns 7 and 8 give the relative run time of Wiedemann and Lanczos, respectively. Note that those instances in which these algorithms seg-fault are indicated with **SF** and those instances whose solutions were incorrect are indicated with bold red text.

| Matrix Name | n | nnz | Cond | norm | SPEX time (hr) | Relative Run Time | |
						Wiedemann	Lanczos
350	6774	33744	7.68E+13	1.26E+06	10.40	0.01	0.01
367	7337	156508	7.64E+13	1.83E+01	10.12	0.04	0.04
696	14454	147972	4.44E+12	5.31E+03	9.78	**SF**	**SF**
695	14454	147972	3.10E+12	5.31E+03	9.67	**SF**	**SF**
213	3402	130371	2.67E+16	3.98E+14	8.31	0.02	0.02
352	5773	71701	8.77E+12	1.29E+08	8.09	0.03	0.03
119	3251	65875	2.62E+16	1.27E+07	7.54	0.01	0.01
344	3363	99471	4.08E+13	3.79E+09	7.37	0.02	0.02
337	5321	65693	2.10E+13	4.68E+06	6.74	0.02	0.02
117	3973	79077	1.49E+19	1.28E+02	6.51	0.02	0.02
346	7055	30082	1.65E+12	4.02E+02	6.35	0.03	0.03
347	7055	30082	6.34E+17	4.02E+02	6.09	***0.02**	***0.02**
140	3937	25407	1.04E+17	3.27E+11	5.06	0.01	0.01
221	4257	37465	2.52E+16	1.46E+02	4.50	***0.01**	***0.01**
222	4257	37465	2.52E+16	1.46E+02	4.49	***0.01**	***0.01**
223	4257	37465	1.21E+19	1.46E+02	4.49	***0.01**	***0.01**
142	3937	25407	1.04E+17	3.27E+11	4.41	0.01	0.01
341	2880	18229	9.74E+13	1.39E+04	4.25	0.01	0.01
349	4101	82682	1.44E+13	1.34E+01	3.54	0.03	0.04
pilot87.pre	1540	30916	Inf	Inf	2.70	0.01	0.01
118	2568	75628	4.01E+15	1.26E+10	2.18	0.04	0.04
pilot87	1625	31396	Inf	Inf	1.85	0.01	0.01
gen4	375	8919	8.43E+236	Inf	1.25	0.01	0.01
217	4720	20042	3.51E+48	1.89E+02	1.16	0.06	0.06
self	924	157411	1.20E+07	1.57E+11	1.15	0.02	0.02
gen4.pre	367	9322	Inf	Inf	1.12	0.01	0.01

Table 1: Comprehensive Results: Large Instances

						Relative Run Time	
Matrix Name	n	nnz	Cond	Norm	SPEX time (min)	Wiedemann	Lanczos
slptsk	2315	34430	4.35E+185	NaN	54.85	0.19	0.19
gen1	329	11016	Inf	Inf	44.42	0.03	0.03
207	1919	32399	3.73E+18	2.92E+00	33.82	0.04	0.04
335	6747	29195	2.22E+18	5.41E+08	32.89	0.21	0.21
87	2500	12349	4.35E+17	9.83E+03	26.86	0.05	0.05
pla8_sig185	39835	196256	4.29E+09	1.04E+03	17.17	0.16	0.17
355	1409	42760	2.28E+13	2.67E+05	13.90	0.08	0.08
159	1050	26198	9.00E+15	2.10E+07	12.37	0.04	0.04
pilot	1132	16624	1.12E+175	NaN	10.04	0.03	0.03
maros-r7	1350	31923	7.43E+06	3.99E+10	8.62	0.03	0.03
320	1733	22189	1.20E+13	1.18E+11	8.30	0.14	0.15
stat96v4	3139	23752	9.62E+17	1.63E+21	6.47	0.17	0.17
pla85900.nov21	40304	230558	5.46E+08	9.76E+02	6.17	0.49	0.50
153	765	24382	1.67E+14	1.35E+17	5.68	0.08	0.08
58	3083	11767	2.30E+21	1.21E+09	5.62	0.23	0.23
momentum3	3254	15159	Inf	Inf	5.36	0.31	0.31
jendrec1	1779	34196	9.54E+217	NaN	4.12	3.64	3.64
296	1258	7682	1.03E+13	2.05E+07	3.99	0.07	0.06
brd14051	16360	180847	2.96E+08	2.74E+02	3.07	0.41	0.41
fome13	24884	70839	7.99E+15	4.02E+11	3.07	0.34	0.34
240	1000	1000000	1.61E+21	6.46E+00	2.69	***6.22**	***6.09**
236	1000	1000000	3.25E+19	3.23E+00	2.38	***6.53**	***6.73**
mod2.pre	4422	12914	3.72E+246	NaN	2.29	1.48	1.48
260	1000	1000000	1.15E+14	5.36E-01	2.23	***7.04**	***7.03**
world	4261	12190	5.65E+241	NaN	2.18	1.26	1.27
l30	2492	12653	1.73E+08	2.61E+09	2.15	0.21	0.22
340	8765	42471	6.15E+14	1.00E+15	1.82	11.26	11.13
cont11_l	58936	179556	3.65E+26	7.37E+00	1.80	9.68	9.67
mod2	4435	12985	1.38E+223	NaN	1.74	1.77	1.79
309	2837	10967	5.85E+12	7.41E+05	1.58	0.82	0.81
314	2836	10965	5.85E+12	7.41E+05	1.58	0.81	0.83
232	1000	1000000	1.85E+21	8.11E-01	1.44	***10.48**	***10.32**
gen2	328	8894	1.84E+11	4.51E+18	1.35	0.04	0.04
scfxm1-2r-256	11812	44985	3.12E+12	2.84E+08	1.11	2.95	2.94

Table 2: Comprehensive Results: Medium Instances

						Relative Run Time	
Matrix Name	n	nnz	Cond	Norm	SPEX time (s)	Wiedemann	Lanczos
nemswrld	2205	13323	NaN	Inf	53.50	0.34	0.34
cont4	2802	11862	3.85E+05	3.98E+03	44.81	0.28	0.29
rat5	902	12026	4.19E+06	7.48E+05	40.77	0.10	0.10
nug30	14681	45627	1.06E+06	7.88E+00	37.07	0.68	0.63

Matrix Name	n	nnz	Cond	Norm	SPEX time (s)	Relative Run Time	
						Wiedemann	Lanczos
nug20	7733	31455	8.84E+07	7.26E+00	35.20	0.26	0.28
stat96v1	5013	20325	6.35E+32	8.22E+20	34.16	0.45	0.44
stat96v2	12928	48009	1.06E+13	1.32E+10	32.85	1.07	1.08
210	1484	6110	5.57E+17	1.26E+16	29.97	0.95	0.96
pla33810	18940	123445	1.05E+08	2.20E+02	29.57	1.64	1.61
stat96v3	13485	49917	3.93E+12	6.98E+09	27.62	1.29	1.31
nug15	5486	24736	2.41E+07	7.73E+00	26.99	0.19	0.17
pilot.ja	567	3781	Inf	Inf	25.13	0.32	0.31
model10	1341	6403	1.71E+164	Inf	24.62	0.50	0.50
rat7a	641	10542	1.38E+20	5.06E+05	18.88	0.12	0.13
d2q06c	1047	5717	1.82E+188	Inf	18.27	0.48	0.48
128	760	5739	1.12E+16	3.10E+08	18.26	0.29	0.29
d15112	9197	47335	2.33E+18	2.25E+11	17.95	2.21	2.23
141	511	2796	6.37E+15	4.21E+10	16.60	0.17	0.16
144	511	2796	6.37E+15	4.21E+10	16.49	0.17	0.17
progas	1167	6500	8.15E+103	6.78E+100	14.19	0.91	0.91
co9	2287	13481	2.32E+49	1.56E+42	13.06	0.98	0.99
stat96v5	812	3795	1.42E+63	3.93E+64	13.00	1.11	1.11
l30.pre	1199	6030	1.79E+06	2.61E+09	12.56	0.24	0.24
scfxm1-2b-64	5966	22682	1.30E+12	2.84E+08	12.11	3.96	3.94
158	416	8562	2.41E+25	2.54E+03	12.08	0.24	0.25
scfxm1-2r-128	5671	21943	1.64E+12	2.84E+08	11.80	3.89	3.85
332	4101	36879	6.72E+20	2.02E+06	11.67	12.63	12.65
NSR8K	5387	46157	2.64E+07	2.06E+03	11.62	0.66	0.66
qap12	2740	12014	2.46E+07	6.84E+00	10.96	0.11	0.11
newman2	468	7917	1.39E+225	Inf	10.85	0.23	0.23
watson_1	5729	14544	7.98E+58	9.72E+55	9.00	10.75	10.84
209	415	2779	1.04E+18	6.47E+00	8.66	0.23	0.25
pilotnov	549	3337	2.82E+264	NaN	8.64	0.54	0.54
239	500	250000	3.27E+20	6.46E+00	8.38	*15.04	*15.55
momentum2	2113	6516	2.52E+39	1.88E+37	8.35	1.10	1.08
238	200	40000	8.07E+19	6.46E+00	8.32	0.68	0.68
pilot4	289	2805	Inf	Inf	7.75	0.57	0.57
235	500	250000	1.01E+19	3.23E+00	7.52	*16.55	*16.30
231	500	250000	8.95E+20	8.11E-01	7.43	*15.82	*16.21
dbic1	4795	23403	1.04E+11	4.53E+06	7.18	1.05	1.04
perold	440	2584	4.45E+256	NaN	7.13	0.56	0.56
259	500	250000	1.65E+14	5.36E-01	7.12	*16.58	*16.49
watson_1.pre	4642	12991	3.44E+58	9.72E+55	7.05	10.03	9.87
cont1_l	1070	4649	1.22E+09	2.51E+05	6.23	0.47	0.46
scfxm1-2r-96	4504	17205	1.35E+12	2.84E+08	6.22	4.32	4.30
126	1220	5884	1.06E+14	9.34E+00	5.99	2.16	2.19
291	1220	5860	1.80E+13	8.78E+00	5.91	2.14	2.16
212	882	3354	7.98E+16	6.69E+12	5.87	1.52	1.51

Matrix Name	n	nnz	Cond	Norm	SPEX time (s)	Relative Run Time	
						Wiedemann	Lanczos
125	1220	5892	1.58E+17	2.88E+00	5.69	2.25	2.24
nug12	2736	12037	2.25E+07	6.97E+00	5.62	0.22	0.23
288	1220	5852	2.74E+13	1.23E+01	5.55	2.35	2.29
pcb3038	3588	46560	2.00E+06	1.55E+02	5.41	0.72	0.72
127	1220	5855	6.25E+14	3.70E+02	5.39	2.36	2.38
model11	2039	7606	1.40E+32	3.38E+29	5.28	1.11	1.10
294	1220	5892	2.74E+13	1.23E+01	5.20	2.49	2.43
287	1220	5888	4.14E+13	1.63E+01	4.65	2.78	2.79
289	1220	5884	1.42E+13	4.95E+00	4.39	2.87	2.86
292	1220	5888	3.45E+13	2.02E+01	4.29	2.94	2.93
nemspmm2	949	6478	2.61E+222	Inf	4.24	1.02	1.02
211	768	2934	1.29E+17	1.36E+13	4.01	1.69	1.67
293	1220	5892	1.58E+13	8.37E+00	3.40	3.65	3.69
stormg2_1000.pre	13926	32547	2.13E+11	2.59E+05	3.27	31.02	31.19
124	1220	5892	2.24E+34	2.87E+00	2.91	3.98	3.92
stormg2_1000	14075	32597	3.77E+09	1.05E+04	2.90	32.90	32.98
152	180	2659	3.59E+17	2.04E+19	2.60	0.32	0.32
fome12	12652	35969	8.93E+05	4.65E+01	2.53	4.63	4.58
nl	890	2919	5.83E+293	Inf	2.46	3.32	3.33
fnl4461	5044	46977	4.12E+06	2.35E+02	2.36	2.28	2.31
model6	790	3425	5.17E+63	4.11E+61	2.35	1.22	1.21
scfxm1-2r-64	1870	11122	8.23E+11	2.84E+08	2.31	4.92	4.93
co5	928	6173	3.86E+185	Inf	2.26	2.21	2.20
pla7397	5059	42683	8.55E+06	3.36E+02	2.17	2.11	2.13
nemspmm1	982	5023	4.94E+23	1.59E+20	2.12	1.30	1.30
315	2053	18447	6.71E+16	2.03E+04	2.09	16.27	16.18
rl11849	6769	40885	1.21E+08	1.92E+02	2.09	3.40	3.36
d18512	10815	55880	8.61E+05	2.09E+02	1.99	7.06	7.00
cq9	1187	5786	4.94E+165	Inf	1.52	3.14	3.13
qap10	1510	6381	4.45E+06	6.13E+00	1.49	0.21	0.20
de080285	368	1493	1.06E+78	1.36E+79	1.41	1.12	1.11
rail4284	2463	11802	3.58E+04	7.23E+00	1.37	0.63	0.63
pilot.we	554	2367	5.11E+137	4.03E+133	1.27	2.60	2.63
newman	334	2156	6.20E+233	Inf	1.24	0.97	0.98
ge	1675	4758	3.29E+130	7.56E+127	1.14	7.58	7.65
rat1	452	2893	3.93E+27	2.26E+30	1.10	0.70	0.68
dano3mip.pre	1091	5239	3.46E+10	1.36E+05	1.08	0.41	0.41
342	10001	49999	4.17E+18	5.00E+03	0.98	***846.53**	***845.32**
t0331-4l	520	5034	2.75E+04	1.10E+01	0.91	0.25	0.25
132	216	812	8.10E+14	1.39E+00	0.89	0.48	0.44
model5	492	2247	7.35E+109	1.03E+108	0.88	2.13	2.09
dano3mip	1135	5390	2.47E+10	1.36E+05	0.85	0.55	0.52
grow22	434	4711	2.09E+17	4.39E+16	0.85	1.29	1.30
rl5915	3853	28829	3.43E+06	1.03E+02	0.82	3.22	3.24

Matrix Name	n	nnz	Cond	Norm	SPEX time (s)	Relative Run Time Wiedemann	Lanczos
model9	902	4361	3.90E+23	6.53E+20	0.75	2.31	2.31
siena1	1265	11573	6.40E+05	7.85E+02	0.67	0.63	0.62
fome11	6226	17749	6.31E+05	5.09E+01	0.64	4.35	4.28
model7	646	2850	2.89E+137	2.87E+134	0.64	2.59	2.61
rl5934	3773	23917	2.94E+06	1.11E+02	0.63	3.26	3.21
nesm	279	895	1.01E+127	1.12E+125	0.63	3.20	3.22
model4	409	1898	9.08E+213	NaN	0.57	2.61	2.59
de063155	313	1233	1.09E+95	6.12E+69	0.54	2.33	2.30
lp22.pre	1811	13146	3.89E+05	1.27E+01	0.52	1.44	1.36
orna1	810	2842	2.66E+13	2.55E+15	0.51	3.36	3.38
lp22	1796	13076	1.32E+05	1.29E+01	0.49	1.60	1.55
scfxm1-2r-32	1447	5658	2.93E+11	2.84E+08	0.46	6.37	6.50
233	100	10000	1.69E+20	3.23E+00	0.44	1.66	1.71
van	7417	21681	4.24E+04	7.23E+00	0.44	7.33	7.27
usa13509	3595	19919	2.89E+08	1.70E+02	0.43	6.23	6.11
237	100	10000	1.08E+19	6.46E+00	0.40	1.92	1.85
arki001	160	893	4.46E+299	Inf	0.37	4.08	4.07
230	200	40000	9.06E+19	8.11E-01	0.37	*15.47	*15.07
greenbeb	713	3278	1.17E+25	9.16E+21	0.36	3.26	3.27
234	200	40000	1.74E+18	3.23E+00	0.35	*15.54	*16.51
280	430	1544	2.91E+13	2.00E+06	0.35	4.89	4.87
258	200	40000	1.40E+14	5.36E-01	0.35	*15.23	*15.24
grow15	297	3614	1.65E+13	4.24E+16	0.34	1.62	1.60
complex	327	10738	9.05E+04	5.39E+01	0.33	0.44	0.43
scfxm1-2r-27	1222	4753	5.08E+10	2.84E+08	0.33	6.63	6.65
newman3	369	3662	1.58E+23	3.91E+19	0.30	1.45	1.47
momentum1	932	2792	1.18E+146	2.49E+141	0.30	7.92	7.89
dfl001	3271	9276	4.54E+05	4.33E+01	0.27	2.82	2.81
dfl001.pre	2097	6501	4.10E+05	3.99E+01	0.27	1.33	1.31
stair	324	3431	1.27E+19	4.02E+15	0.27	1.18	1.15
stocfor3	1782	4562	2.03E+31	3.50E+27	0.26	23.01	22.94
large000	823	2282	1.39E+31	1.02E+34	0.25	14.33	14.49
ulevimin	697	1879	8.89E+103	5.41E+96	0.24	5.86	5.95
t1717	549	3657	1.89E+04	7.40E+00	0.24	0.40	0.44
de063157	282	1102	1.10E+97	6.45E+77	0.24	4.26	4.30
car4	122	4384	1.30E+14	4.51E+15	0.22	1.35	1.35
greenbea	664	2706	2.17E+38	2.38E+32	0.21	4.38	4.46
pcb3000	3058	27446	5.01E+04	6.24E+01	0.21	6.87	6.91
25fv47	416	2061	1.42E+35	7.33E+32	0.21	2.01	1.94
277	183	1069	2.69E+13	1.15E+09	0.20	*1.46	*1.45
stp3d	10642	25936	4.12E+05	4.28E+00	0.20	28.09	27.93
trento1	1070	10010	1.54E+05	6.57E+02	0.19	1.23	1.23
cq5	570	2615	1.05E+164	Inf	0.19	5.51	5.48
dc1l	851	5171	1.68E+05	9.70E+02	0.18	0.72	0.72

					SPEX time (s)	Relative Run Time	
Matrix Name	n	nnz	Cond	Norm		Wiedemann	Lanczos
gran	284	1958	7.38E+32	1.25E+27	0.17	3.00	3.00
dg012142	892	3627	9.32E+07	2.13E+04	0.15	2.51	2.42
nug08	732	3004	2.49E+05	5.71E+00	0.15	0.42	0.43
watson_2	1011	2703	7.02E+42	1.78E+40	0.15	10.16	10.25
dc1c	808	4698	1.26E+06	9.63E+02	0.14	0.79	0.81
scfxm1-2r-16	752	2962	1.94E+10	2.84E+08	0.13	5.99	6.02
air04	630	4187	1.29E+04	8.67E+00	0.12	0.55	0.55
aa01	630	4187	1.29E+04	8.67E+00	0.12	0.57	0.56
nemsemm2	789	2440	1.78E+124	1.79E+123	0.12	16.53	16.46
scfxm1-2b-16	784	2975	3.37E+10	2.84E+08	0.12	6.69	6.76
pf2177	406	1772	9.40E+03	4.65E+00	0.12	0.27	0.28
dolom1	806	5681	3.47E+05	2.27E+03	0.11	1.11	1.13
model3	310	1417	3.11E+95	6.44E+93	0.10	3.27	3.25

Table 3: Comprehensive Results: Small Instances

					SPEX Left LU time (ms)	Relative Run T	
Matrix Name	n	nnz	Cond	Norm		Wiedemann	L
ds	647	12193	1.01E+04	2.08E+01	9.85	2.83	
ch	393	1304	4.36E+110	3.12E+106	9.21	8.74	
nug07	450	1780	5.45E+04	5.28E+00	8.92	0.80	
229	100	10000	6.48E+18	8.11E-01	8.51	*8.37	
cr42	304	608	1.52E+35	1.86E+84	8.10	40.60	
143	131	536	1.49E+15	9.77E+09	8.05	2.95	
delf000	593	1606	1.27E+18	1.44E+20	7.23	18.52	
257	100	10000	3.09E+14	5.36E-01	6.99	*9.84	*
air06	562	3420	1.07E+04	9.00E+00	6.79	0.60	
protfold	574	2562	8.36E+03	6.50E+00	6.71	0.66	
pldd000b	537	1448	9.92E+18	1.27E+22	6.59	16.57	
279	261	2319	7.54E+16	2.03E+04	6.46	9.95	
msc98-ip	2897	10006	1.63E+07	4.26E+02	6.32	21.45	
l9	241	1381	7.65E+21	1.74E+19	6.18	2.44	
model2	149	757	1.15E+112	4.60E+108	6.16	2.54	
pcb1000	1156	9955	2.28E+04	4.37E+01	6.15	3.06	
aa03	562	3420	1.07E+04	9.00E+00	5.79	0.72	
lpl1	2692	7211	8.18E+08	1.02E+04	5.16	16.99	
biella1	813	5726	2.72E+04	1.18E+01	5.03	2.78	
grow7	138	1744	8.45E+12	3.53E+16	4.91	2.86	
bg512142	560	2140	6.92E+06	1.95E+03	4.71	3.18	
139	131	536	1.49E+15	9.77E+09	4.53	3.45	
rosen10	989	6916	2.01E+03	1.35E+03	4.23	10.79	
stormg2-125.pre	1780	4138	1.96E+09	5.43E+04	4.04	35.78	
df2177	414	1825	4.61E+03	4.74E+00	3.96	1.99	

						Relative Run T...	
Matrix Name	n	nnz	Cond	Norm	SPEX Left LU time (ms)	Wiedemann	L...
stormg2-125	1886	4372	2.63E+07	2.26E+03	3.94	39.34	
rosen2	431	4143	7.85E+02	3.19E+02	3.63	3.88	
degen3	744	5431	1.66E+04	2.00E+01	3.52	1.70	
10teams	177	885	1.12E+03	5.63E+00	3.50	0.87	
scsd8	247	655	9.59E+18	1.58E+17	3.44	5.35	
pds-80	9225	19432	1.12E+04	5.66E+00	3.36	115.71	
bas1lp	502	6651	9.77E+04	9.80E+01	3.28	3.22	
pilot4i	134	1220	1.50E+33	4.19E+28	3.15	4.41	
cycle	284	878	1.46E+79	3.19E+75	2.99	6.23	
pds-100	8377	17555	1.79E+04	5.48E+00	2.97	109.88	
scfxm1-2r-8	403	1608	7.45E+09	2.84E+08	2.94	7.89	
air05	323	1789	2.79E+04	6.94E+00	2.87	1.90	
pds-60	7586	16067	8.18E+03	4.48E+00	2.56	104.72	
gosh	379	1379	8.05E+27	4.51E+24	2.49	12.14	
pds-90	7914	16673	1.48E+04	4.13E+00	2.43	114.84	
pds-70	7822	16545	1.11E+04	5.84E+00	2.14	132.65	
maros	289	1143	2.76E+14	2.54E+11	2.13	4.07	
ganges	344	1123	4.19E+26	3.03E+25	2.01	10.46	
fast0507	401	1908	3.72E+03	6.99E+00	1.94	3.54	
bandm	122	609	1.12E+27	1.05E+26	1.94	3.02	
pds-50	5962	12592	1.04E+04	3.49E+00	1.87	81.12	
rail507	413	2005	5.39E+03	6.85E+00	1.87	3.09	
30_70_4.5_0.95_100	2754	8381	6.12E+03	4.34E+00	1.83	36.49	
baxter.pre	470	1274	3.55E+94	8.48E+88	1.61	13.78	
modszk1	263	765	1.52E+21	1.25E+20	1.59	9.74	
30_70_4.5_0.95_98	2451	7364	7.84E+03	4.35E+00	1.54	28.46	
30_70_4.5_0.5_100	2098	6197	1.98E+03	4.28E+00	1.48	21.62	
d6cube	223	1424	9.56E+05	4.24E+02	1.47	2.78	
rentacar	327	1080	3.64E+05	1.01E+03	1.41	2.27	
qiulp	603	1717	8.25E+10	1.31E+09	1.38	9.67	
nug06	267	1007	1.04E+04	4.81E+00	1.35	2.36	
qiu	603	1717	5.99E+10	1.31E+09	1.33	10.16	
scfxm1-2c-4	233	965	5.92E+09	2.84E+08	1.23	6.22	
rosen1	217	2528	1.23E+03	5.80E+02	1.15	3.85	
pds-40	4028	8478	6.64E+03	3.02E+00	1.10	50.46	
bnl2	459	1488	1.22E+15	1.10E+12	1.07	20.38	
mitre	801	2466	4.18E+05	2.81E+03	1.07	37.24	
pds-30	2643	5641	3.27E+03	3.04E+00	1.07	30.21	
rail516	268	936	1.31E+03	5.64E+00	0.98	4.05	
fome21	3291	7240	9.21E+03	3.18E+00	0.98	48.53	
south31	112	460	1.68E+265	Inf	0.95	12.15	
rail582	384	1387	4.55E+03	5.10E+00	0.93	7.41	
seymour	537	1881	5.24E+03	5.81E+00	0.92	4.72	
scfxm1-2b-4	233	965	5.92E+09	2.84E+08	0.84	9.50	

						Relative Run T...	
Matrix Name	n	nnz	Cond	Norm	SPEX Left LU time (ms)	Wiedemann	L...
sp97ar	271	2400	2.40E+04	3.93E+01	0.82	5.84	
neos6	174	1580	3.33E+03	7.20E+01	0.82	4.64	
neos	2342	5098	3.29E+04	5.88E+00	0.77	25.92	
r05	919	2717	4.06E+04	3.06E+01	0.75	12.87	
manna81	1392	2784	3.00E+00	2.00E+00	0.73	11.09	
p05	919	2717	4.06E+04	3.06E+01	0.67	14.18	
scfxm1-2r-4	233	965	5.92E+09	2.84E+08	0.65	12.17	
bnl1	223	824	3.34E+23	2.35E+20	0.65	13.63	
rosen8	264	1850	2.53E+02	8.87E+01	0.57	6.49	
scagr7-2r-864	680	1697	6.99E+06	3.42E+03	0.57	49.66	
sp98ar	223	1782	1.69E+04	4.43E+01	0.55	10.46	
fome20	1718	3811	5.39E+03	3.14E+00	0.55	27.11	
scrs8-2r-512	992	1984	1.92E+01	9.13E+00	0.54	29.88	
disctom	192	565	5.92E+02	3.41E+00	0.52	3.41	
scfxm3	262	1005	1.67E+17	7.58E+13	0.52	18.62	
danoint	196	790	2.11E+07	6.31E+03	0.51	9.36	
mzzv11	1098	3189	8.92E+05	2.46E+02	0.47	27.67	
80bau3b	154	396	3.31E+46	1.75E+45	0.46	17.53	
dbir2.pre	281	1879	5.86E+06	1.10E+05	0.43	8.86	
capri	138	507	3.72E+68	3.01E+65	0.43	23.65	
p010	839	2486	3.96E+04	3.06E+01	0.41	19.48	
degen2	217	1138	2.58E+03	1.15E+01	0.40	4.24	
scfxm2	178	658	1.67E+17	7.58E+13	0.37	12.38	
baxter	256	697	3.06E+21	6.81E+15	0.37	15.96	
dbir1	154	845	4.54E+06	1.42E+06	0.35	17.05	
small000	140	383	6.77E+19	5.59E+23	0.34	29.03	
stormg2-27	449	1019	3.67E+06	1.77E+03	0.34	21.32	
roll3000	177	1101	2.19E+06	1.47E+03	0.34	18.49	
woodw	168	589	1.44E+12	3.80E+10	0.32	19.94	
route	339	1290	7.27E+08	2.03E+07	0.32	22.68	
nsct1	120	595	4.25E+06	7.67E+05	0.31	16.26	
neos.pre	2080	4578	1.60E+04	5.86E+00	0.29	56.91	
mzzv42z	787	2124	5.68E+05	2.01E+02	0.27	24.22	
crew1	127	861	7.82E+02	8.18E+00	0.27	7.76	
neos7	590	1434	1.46E+08	1.00E+06	0.26	54.87	
sgpf5y6	787	1870	6.24E+02	3.37E+00	0.22	34.46	
neos1	309	944	8.24E+02	4.83E+00	0.22	8.65	
neos11	365	1116	3.06E+03	5.06E+00	0.22	23.94	
nsct2.pre	156	1140	3.84E+06	3.22E+05	0.21	18.44	
stocfor2	224	576	3.54E+26	1.50E+24	0.21	46.90	
scrs8-2r-256	416	832	1.92E+01	9.13E+00	0.20	38.34	
neos4	454	944	2.63E+08	5.59E+06	0.20	38.63	
blp-ar98	148	876	3.94E+03	9.40E+01	0.19	25.82	
dsbmip	220	568	3.06E+46	2.19E+41	0.19	31.23	

| | | | | | | Relative Run |
Matrix Name	n	nnz	Cond	Norm	SPEX Left LU time (ms)	Wiedemann	L
sgpf5y6.pre	755	1744	1.20E+02	3.22E+00	0.18	42.42	
neos823206	220	547	3.15E+05	2.24E+03	0.15	24.58	
sc205	184	487	1.18E+04	2.10E+01	0.15	21.46	
rosen7	127	649	8.23E+01	5.75E+01	0.14	39.64	
scrs8-2r-64	256	512	1.60E+05	1.41E+05	0.14	54.87	
pp08aCUTS	131	332	1.44E+04	4.27E+02	0.13	14.12	
scorpion	131	507	7.19E+06	2.00E+05	0.13	39.44	
lpl3	212	461	3.06E+02	2.61E+00	0.13	4.52	
p19	117	555	4.13E+05	4.37E+04	0.12	64.73	
iiasa	113	262	6.06E+18	6.37E+17	0.12	28.25	
pds-20.pre	370	851	1.07E+03	3.38E+00	0.12	25.30	
rd-rplusc-21	148	454	7.35E+16	4.38E+13	0.11	58.47	
neos19	228	487	7.19E+04	5.23E+01	0.11	59.49	
gesa2_o	102	214	6.47E+09	4.13E+08	0.11	51.49	
boeing1	122	415	7.36E+10	6.29E+07	0.11	46.04	
gesa3_o	148	365	1.73E+29	1.19E+26	0.10	52.90	
gesa3	134	336	1.73E+29	1.19E+26	0.10	69.71	
UMTS	268	828	4.40E+20	3.24E+18	0.10	67.24	
scrs8	109	280	2.97E+27	8.93E+24	0.10	81.52	
scrs8-2r-128	192	384	1.92E+01	9.13E+00	0.10	19.11	
scrs8-2c-64	168	336	4.80E+01	2.66E+01	0.09	35.05	
ceria3d	130	647	2.40E+04	1.09E+01	0.09	11.93	
stormg2-8	117	263	4.82E+05	1.77E+03	0.09	24.41	
nsct2	107	544	2.74E+06	2.40E+05	0.09	20.69	
mkc	106	250	1.27E+06	2.89E+04	0.09	16.57	
scrs8-2r-32	128	256	4.16E+01	3.54E+01	0.09	26.58	
dbir2	157	784	1.71E+06	7.27E+04	0.09	30.31	
neos818918	265	678	4.29E+02	3.22E+00	0.09	26.79	
mkc1	106	250	1.27E+06	2.89E+04	0.08	13.77	
bienst1	102	253	7.61E+02	6.09E+00	0.06	11.97	
nug05	107	362	1.14E+03	4.15E+00	0.06	5.53	
dcmulti	120	303	7.03E+03	6.26E+02	0.05	35.72	

Table 4: Comprehensive Results: Tiny Instances