How is the error computed:

Relative residual:

$$\text{RR} = \frac{\|b - Ax\|}{\|b\|}$$

Name	av. RR	Failure rate
TAMU 500		
CPU/GPU	$1.52 \cdot 10^{-7}$	0 %
Case 118		
CPU/GPU	$4.40 \cdot 10^{-6}$	0 %
RTS – 1 TP		
CPU/GPU	$2.21 \cdot 10^{-7}$	0%
RTS – 2 TP		
CPU/GPU	$3.74 \cdot 10^{-7}$	0%
ACTIVSg200		
CPU/GPU	$3.02 \cdot 10^{-7}$	0%
ACTIVSg2000		
CPU/GPU	$7.31 \cdot 10^{-7}$	0%
ACTIVSg10k		
CPU/GPU	$1.16 \cdot 10^{-6}$	0%
ACTIVSg70k		
CPU/GPU	$4.93 \cdot 10^{-7}$	0%

Table 1: The error levels achieved in PaStiX. Failure rate is 0% for all the test cases.

All results presented in this document have been computed on one node of the PNNL marianas supercomputer. PaStiX computations can be split into nine basic phases:

1. Internal csc
2. Coeftab
3. Ordering
4. Symbolic factorization
5. Reordering
6. Mapping and scheduling
7. Factorization
8. Solve
9. Iterative refinement

TAMU 500										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.0197	0.0092	0.4024	0.0041	0.0248	0.0051	0.0882	0.0085	0.0119	0.5739
GPU	0.0198	0.0093	0.4049	0.0041	0.0248	0.0052	0.0885	0.0085	0.012	0.5771

Case 118										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.142	0.0489	3.042	0.0286	0.0896	0.0305	0.3887	0.0554	1.5238	5.3491
GPU	0.1481	0.0465	3.1728	0.0307	0.1082	0.0308	0.3969	0.0573	1.5777	5.5689

Ipopt – one time period										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.0005	0.0002	0.0099	0.0003	0.0008	0.0002	0.0035	0.0004	0.0001	0.0157
GPU	0.0005	0.0002	0.01032	0.0002	0.0006	0.0002	0.0033	0.0004	0.0001	0.0158

Ipopt – two time period										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.001	0.0004	0.02479	0.0004	0.0017	0.0005	0.0076	0.0008	0.0006	.0379
GPU	0.001	0.0006	0.0253	0.0004	0.0014	0.0005	0.0076	0.0008	0.0006	.0382

ACTIVSg200										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.001	0.0004	0.0263	0.0003	0.0013	0.0004	0.0073	0.0007	0.0001	0.0377
GPU	0.001	0.0003	0.0213	0.0003	0.0015	0.0004	0.0066	0.0006	0.0001	0.0321

ACTIVSg2000										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.0153	0.0085	0.3556	0.0048	0.0174	0.0073	0.0848	0.009	0.0048	0.5076
GPU	0.0146	0.0079	0.361	0.0046	0.0202	0.006	0.0856	0.0092	0.005	0.5142

ACTIVSg10k										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.0907	0.0338	1.6269	0.0225	0.0703	0.0345	0.3239	0.0481	0.7391	2.9897
GPU	0.0966	0.0363	1.6772	0.0224	0.0845	0.0344	0.3302	0.0487	0.739	3.0693

ACTIVSg70k										
Method	Internal csc	Coeftab	Order	Symbol	Reorder	Map	Factor	Solve	Refine	Total
CPU	0.8378	0.2742	13.4336	0.1793	0.5734	0.3912	2.366	0.4065	0.2232	18.6851
GPU	0.8222	0.268	13.4487	0.1771	0.6525	0.38	2.371	0.3989	0.2205	18.7389

Table 2: PaStiX performance on the CPU and on the GPU.

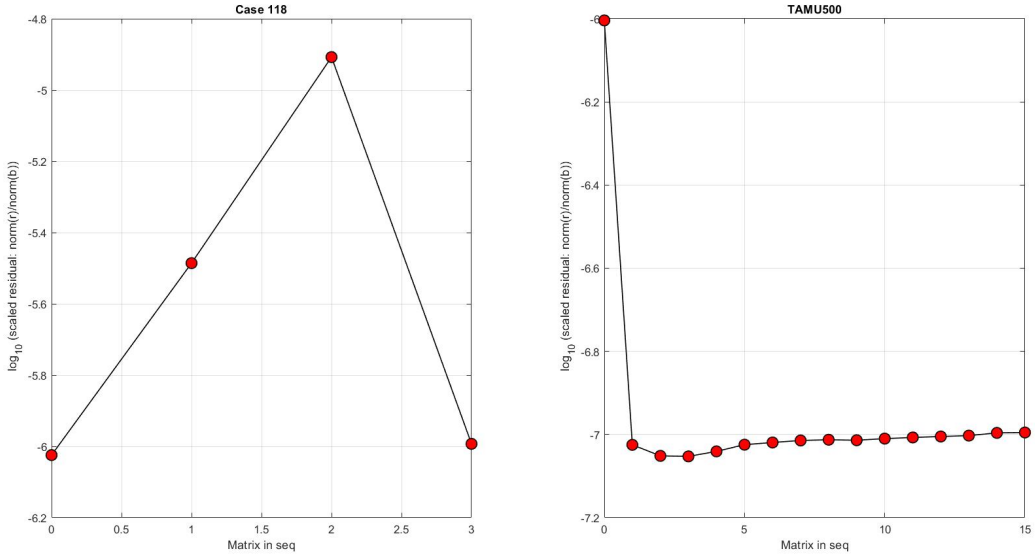

Figure 1: RR for Case 118 (left) and TAMU500 (right)

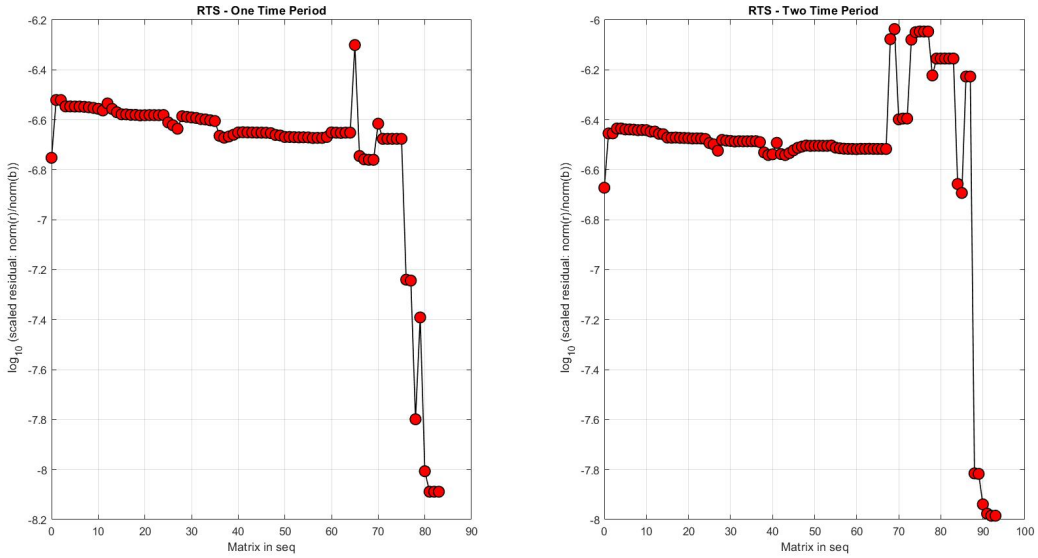

Figure 2: RR for RTS One (left) and Two (right) Time Period

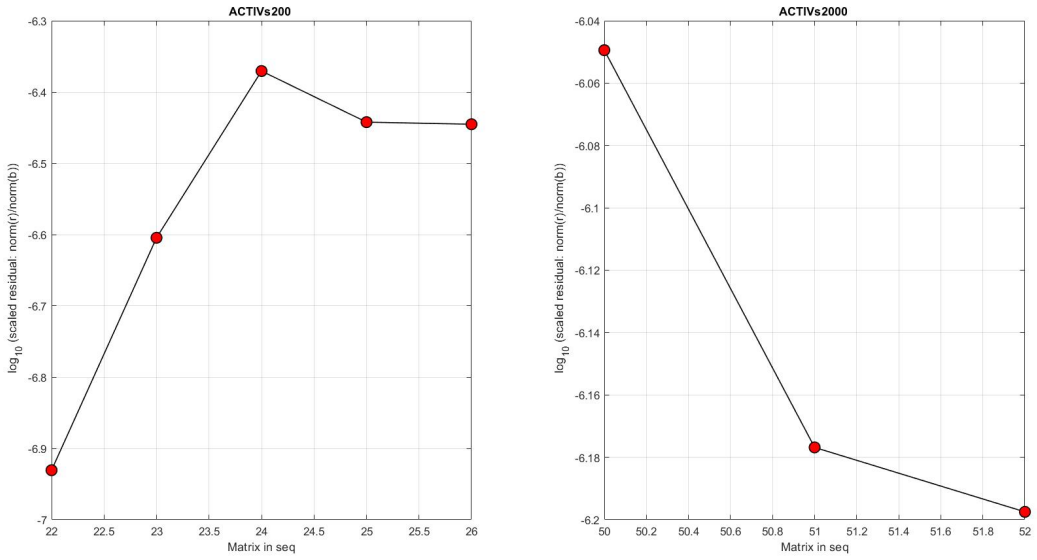

Figure 3: RR for ACTIVs200 (left) and ACTIVs2000 (right)

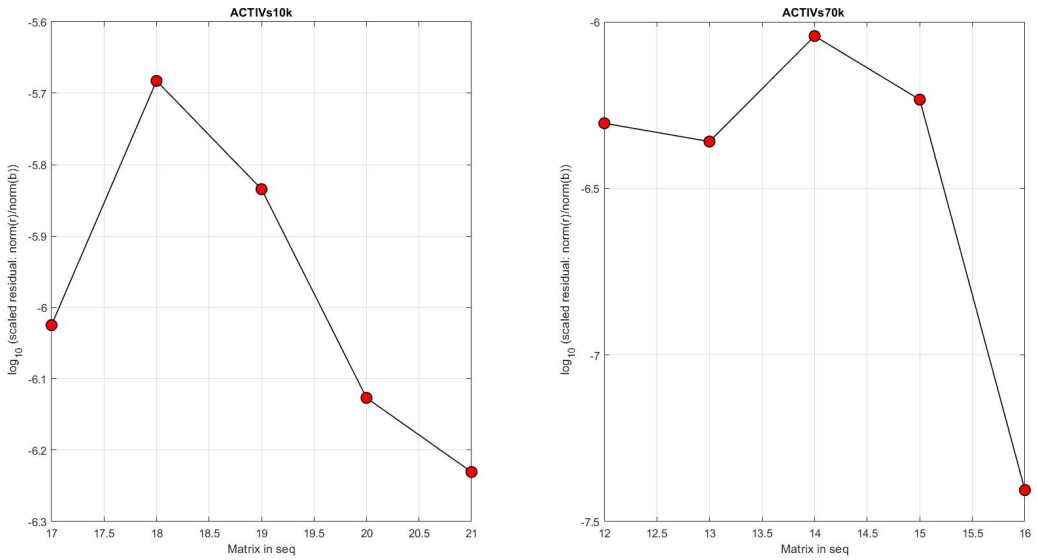

Figure 4: RR for ACTIVs10k (left) and ACTIVs70k (right)