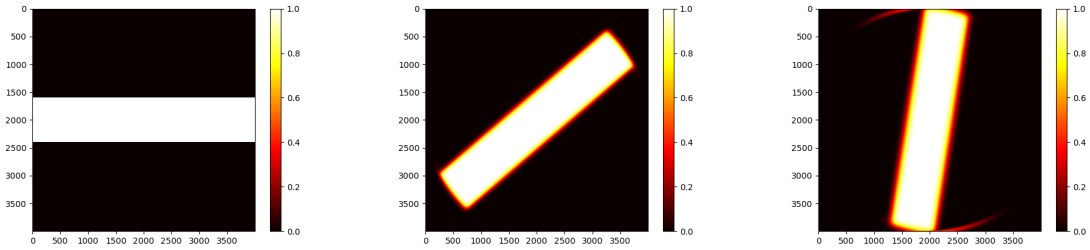# Project 1 - Final Report

Yue (Zoey) Zhang
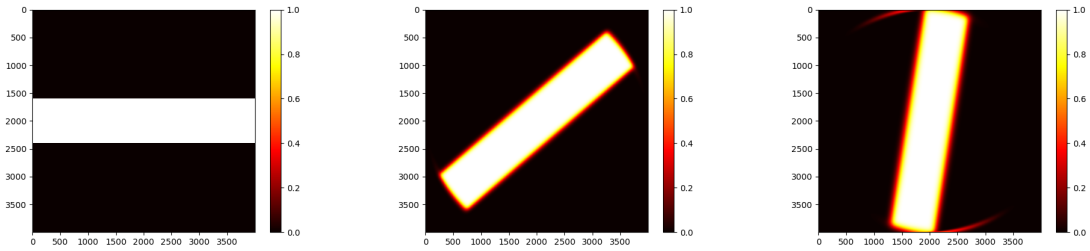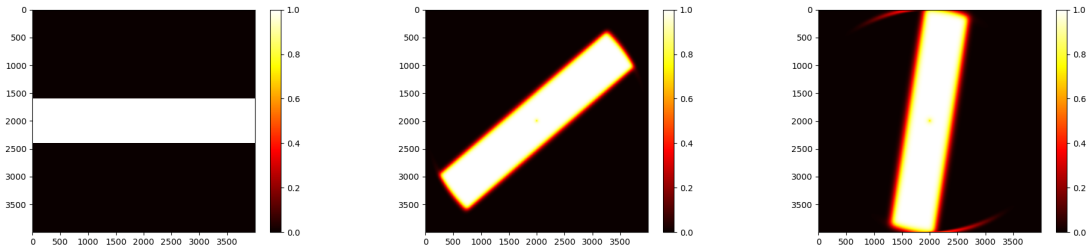
January 2024

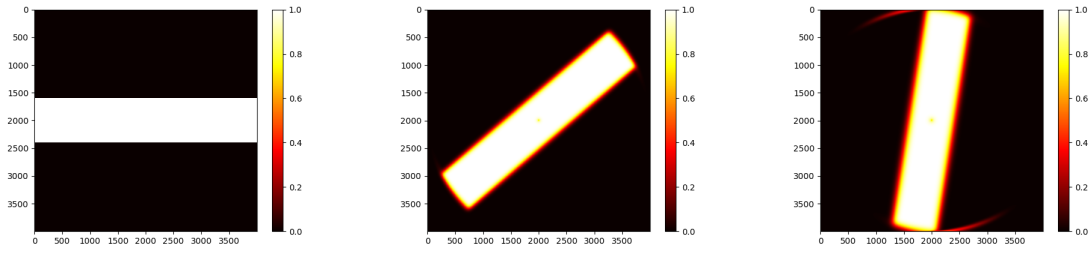## 1 Verification

- Serial Lax, $N = 4000$:

- Shared Memory Parallel Lax, $N = 4000$, $ncores = 16$:

- Distributed Memory Parallel Lax, $N = 4000$, 1 core per node, 4 nodes:

- Distributed Memory Parallel Lax, $N = 4000$, 16 core per node, 16 nodes, hybrid 1 MPI rank per node:

2 Performance

Programming Model	Nodes	Cores Per Node	Execution Time (sec)
MPI	1	1	543.76
MPI	2x1	1	257.04
MPI	2x2	1	141.05
MPI	3x3	1	74.44
MPI	4x4	1	42.98
OpenMP	1	1	513.46
OpenMP	1	2	529.15
OpenMP	1	4	519.73
OpenMP	1	9	533.49
OpenMP	1	16	519.69
Hybrid	1	16	517.41
Hybrid	2x1	16	264.61
Hybrid	2x2	16	142.06
Hybrid	3x3	16	70.78
Hybrid	4x4	16	42.16

Fastest runtime: 42.16s