

Table 1: Results of the diffusion equation.

model	N_c	relative L_2 error	RMSE	PINN Loss	runtime (ms/iter.)	memory (MB)
PINN + modified MLP	16^3	4.82e-3	4.94e-4	2.91e-6	3.98	1,022
	32^3	4.31e-3	4.18e-4	2.38e-6	12.82	2,942
	64^3	4.08e-3	3.84e-4	9.17e-7	95.22	18,122
SPINN + modified MLP	16^3	3.90e-2	3.18e-3	1.05e-5	1.45	766
	32^3	6.73e-3	6.90e-4	2.42e-6	1.76	766
	64^3	4.07e-3	3.82e-4	7.79e-7	1.90	766
	128^3	3.64e-3	3.61e-4	6.59e-7	2.09	894
	256^3	3.62e-3	3.38e-4	5.43e-7	10.54	2,174

Table 2: Results of the (2+1)-d Klein-Gordon equation.

model	N_c	relative L_2 error	RMSE	PINN Loss	runtime (ms/iter.)	memory (MB)
PINN + modified MLP	16^3	1.58e-2	1.18e-2	1.94e-3	3.98	1,022
	32^3	1.85e-2	1.78e-2	1.14e-3	12.82	2,942
	64^3	1.63e-2	1.43e-2	1.23e-3	95.22	18,122
SPINN + modified MLP	16^3	6.22e-3	2.01e-3	1.26e-3	1.45	766
	32^3	2.03e-3	6.96e-4	2.56e-4	1.76	766
	64^3	1.29e-3	4.97e-4	7.93e-5	1.90	766
	128^3	8.45e-4	3.75e-5	4.35e-5	2.09	894
	256^3	9.17e-4	4.78e-4	4.66e-5	10.54	2,174

Table 3: Results of the (2+1)-d Navier-Stokes equation.

model	PINN+mod		causal PINN			SPINN (ours)		
	N_c	2 ¹²	2 ¹⁵	2 ¹²	2 ¹⁵	2 ¹⁵	2 ¹⁸	2 ²¹
relative L_2 error	0.0694	0.0581	0.0578	0.0401	0.0353	0.0780	0.0363	0.0355
RMSE	4.66e-1	4.66e-1	-	-	-	4.89e-1	2.34e-1	2.09e-1
PINN Loss	3.04	2.86	-	-	-	5.99	1.32	1.46
runtime (hh:mm)	03:20	07:52	10:09	23:03	-	00:07	00:09	00:14
memory (MB)	5,198	17,046	5,200	17,132	-	764	892	1,276

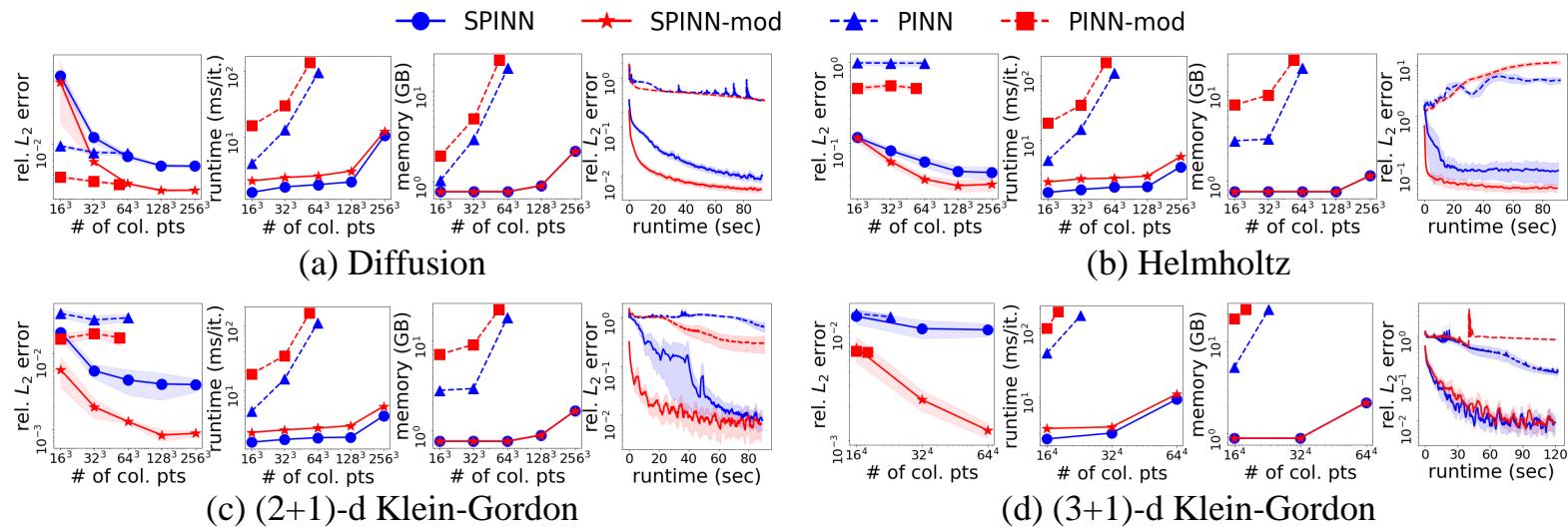


Figure 1: Magnified version of Figure 6 in the main paper.

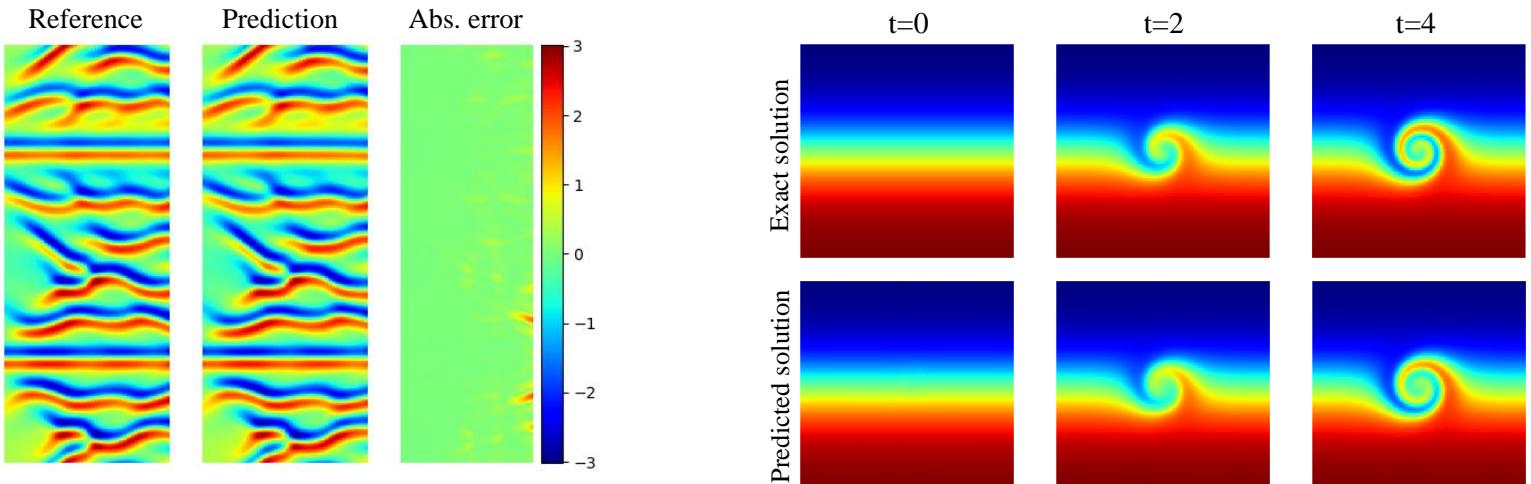


Figure 2: Visualized result of the chaotic Kuramoto-Sivashinsky equation.

Figure 3: Visualized result of the flow mixing problem.