Multilevel Methods for HPC Figures

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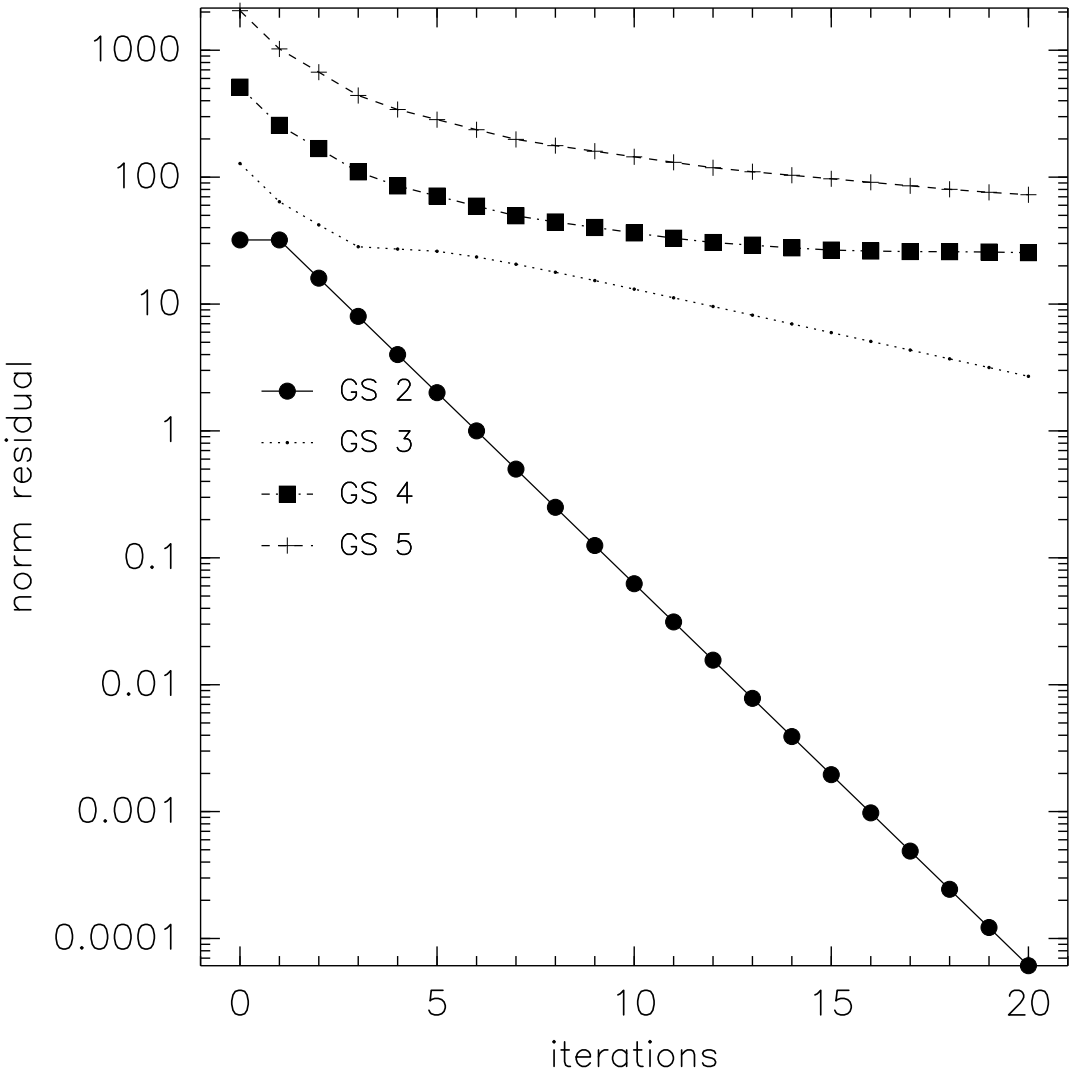
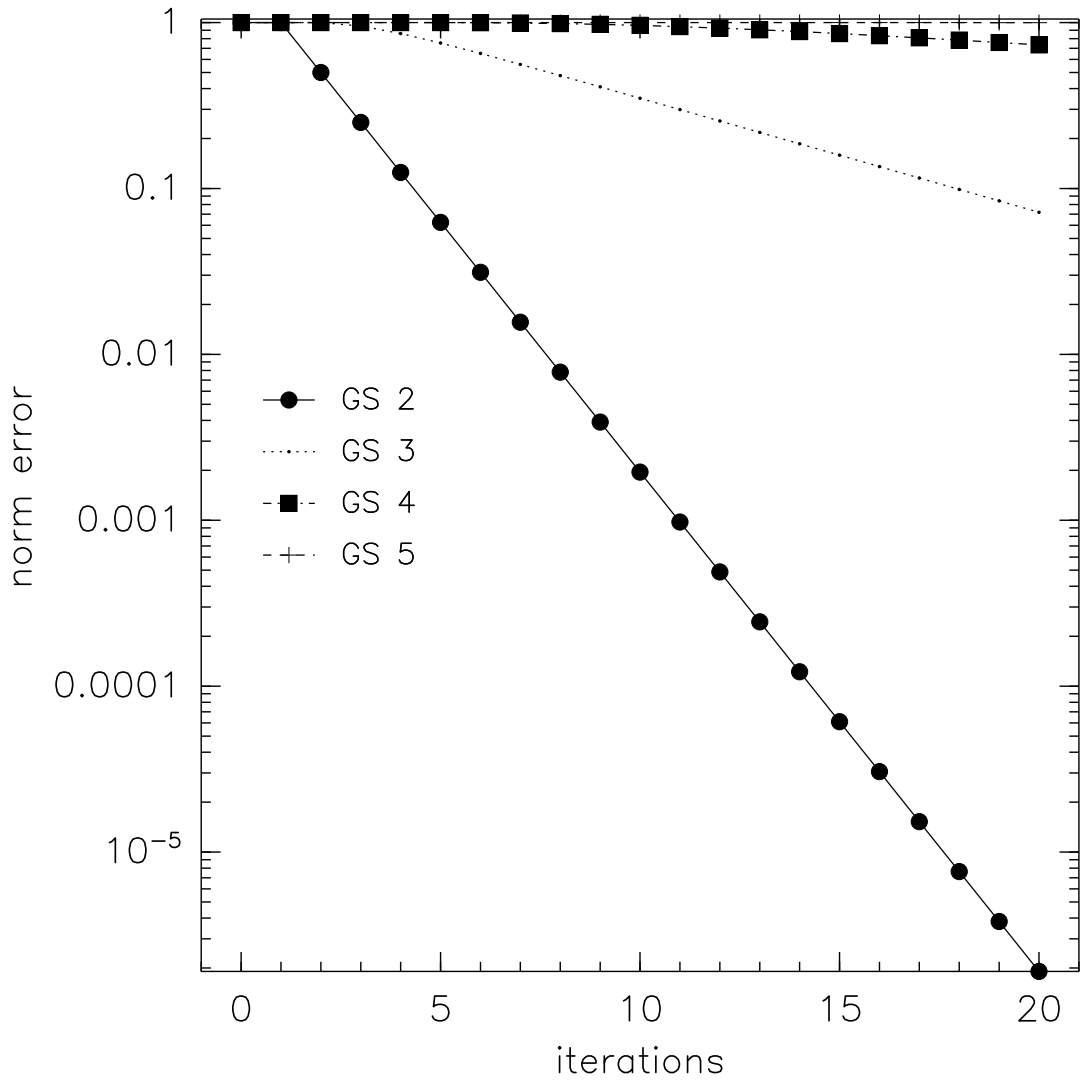
Gauss-Seidel Residual Convergence



Gauss-Seidel Error Convergence

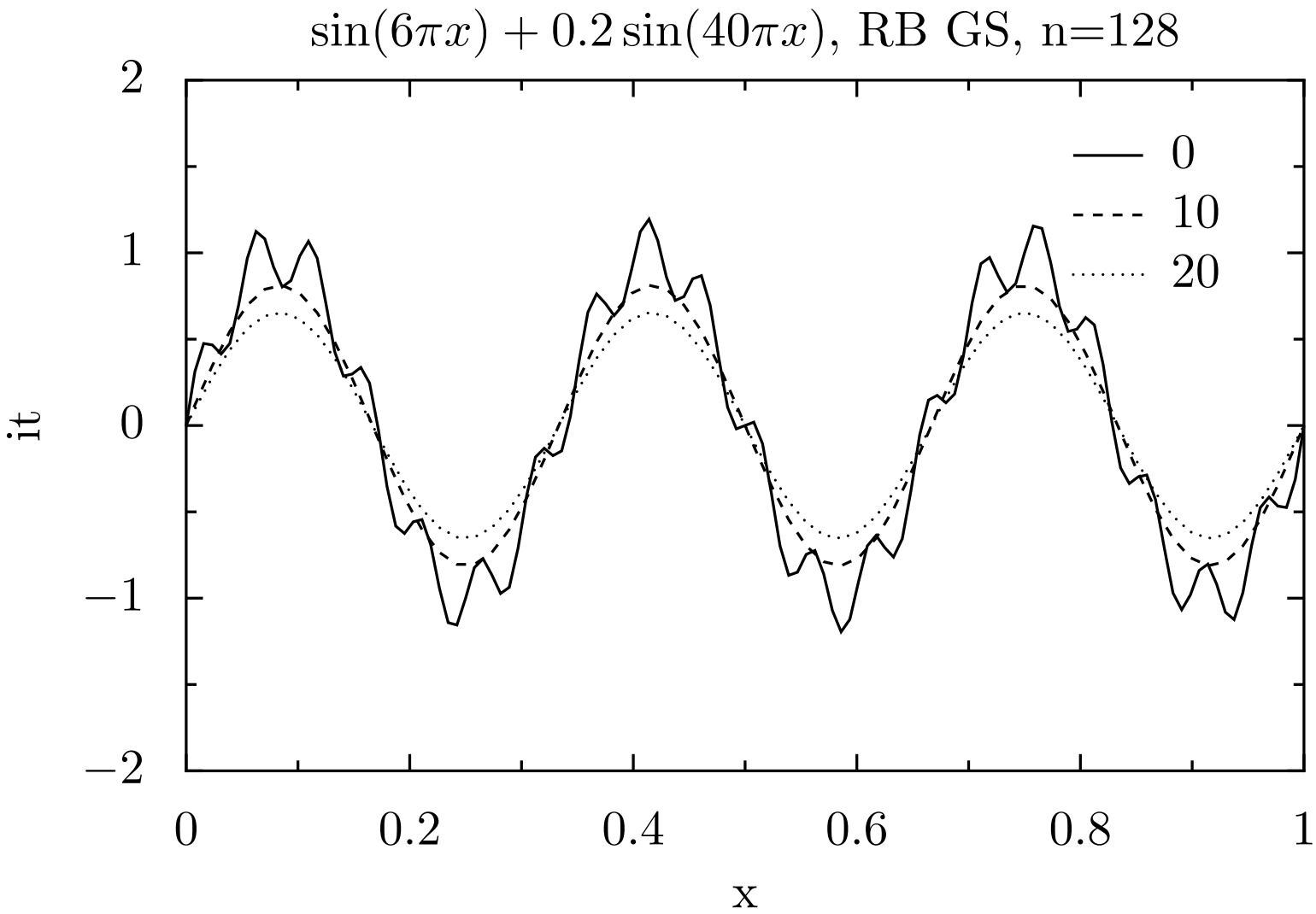


Gauss-Seidel Error Convergence

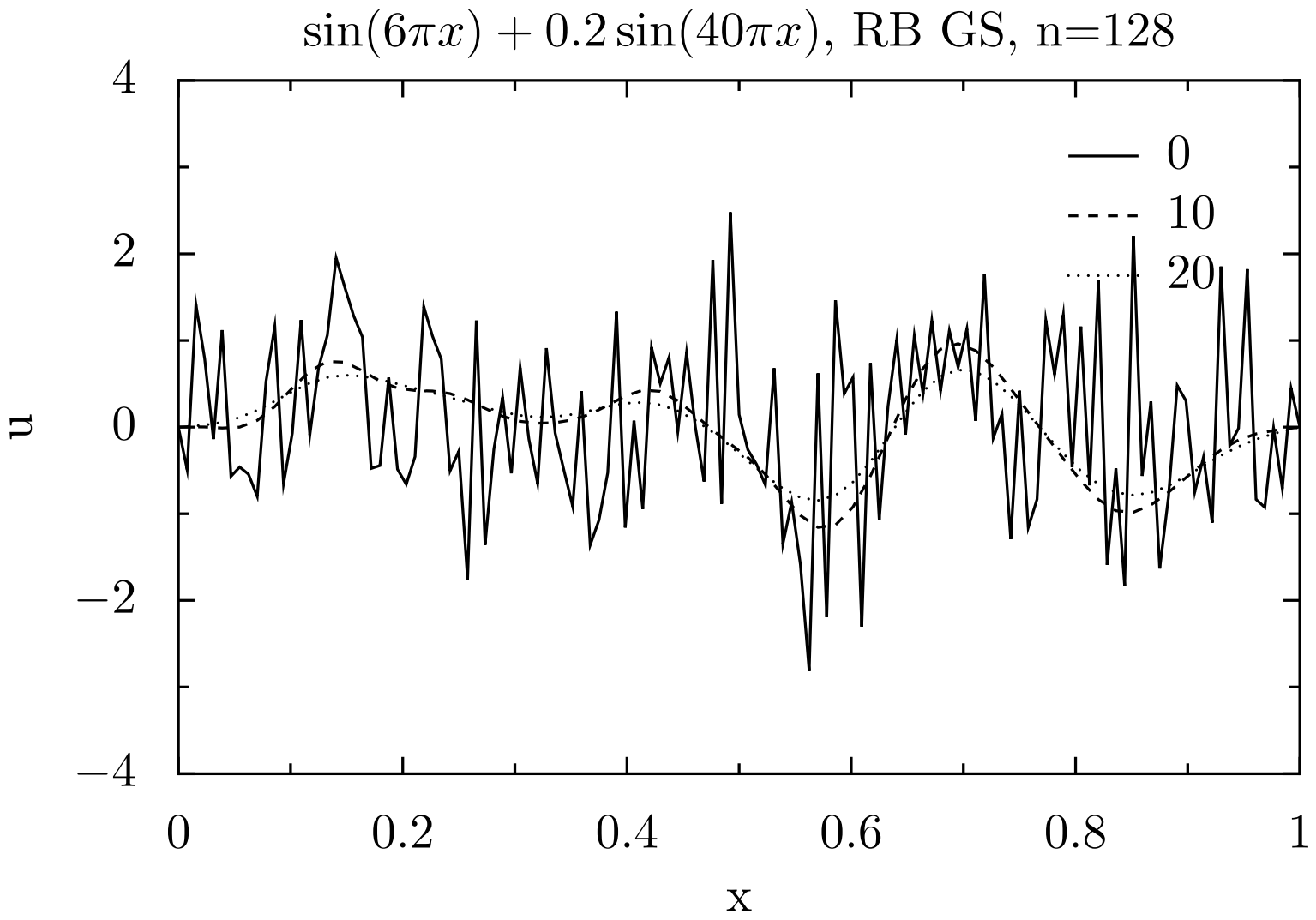
- Poisson equation
- grids with $n_x = n_y = 2^{l+1}$.
- red-black Gauss-Seidel and multigrid methods
- convergence rates $R = -\log_{10} \rho$

$R(l)$	l	3	4	5	6	7	8
GS	0.30	0.07	0.01	0.00	0.00	0.00	0.00
MG	1.20	0.98	0.93	0.92	0.92	0.92	0.92

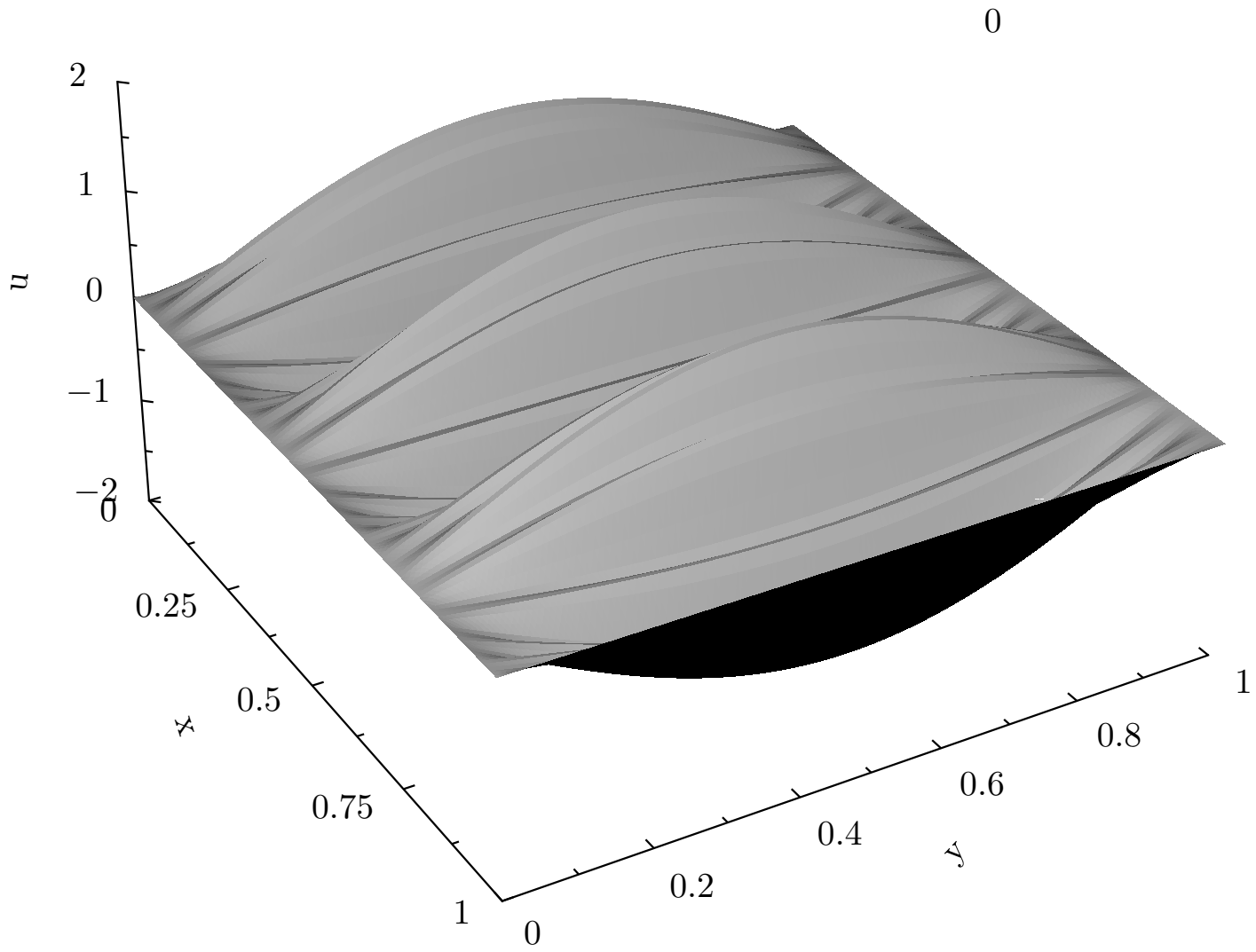
Smoothing 1D: Sine Waves



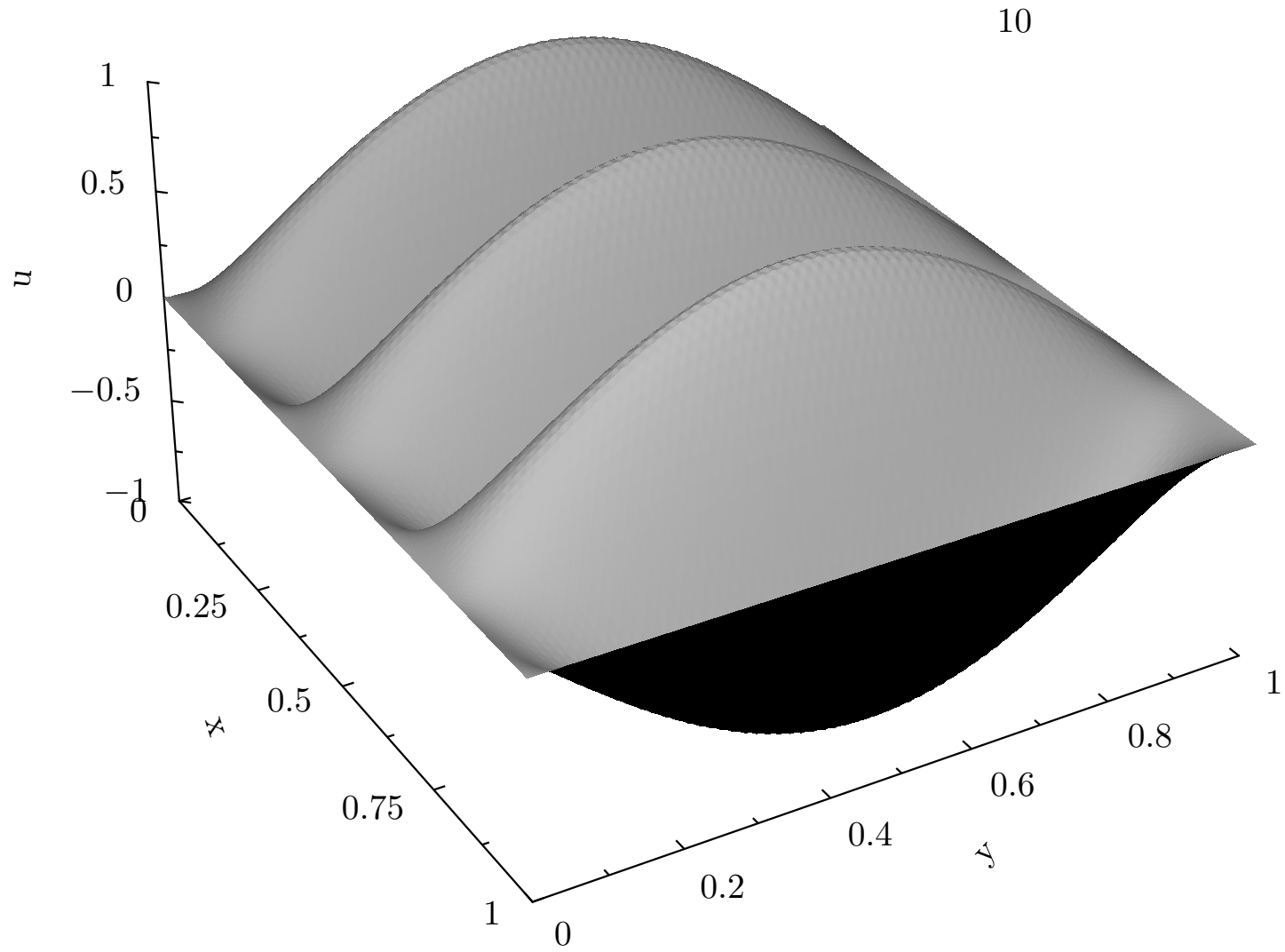
Smoothing 1D: Random



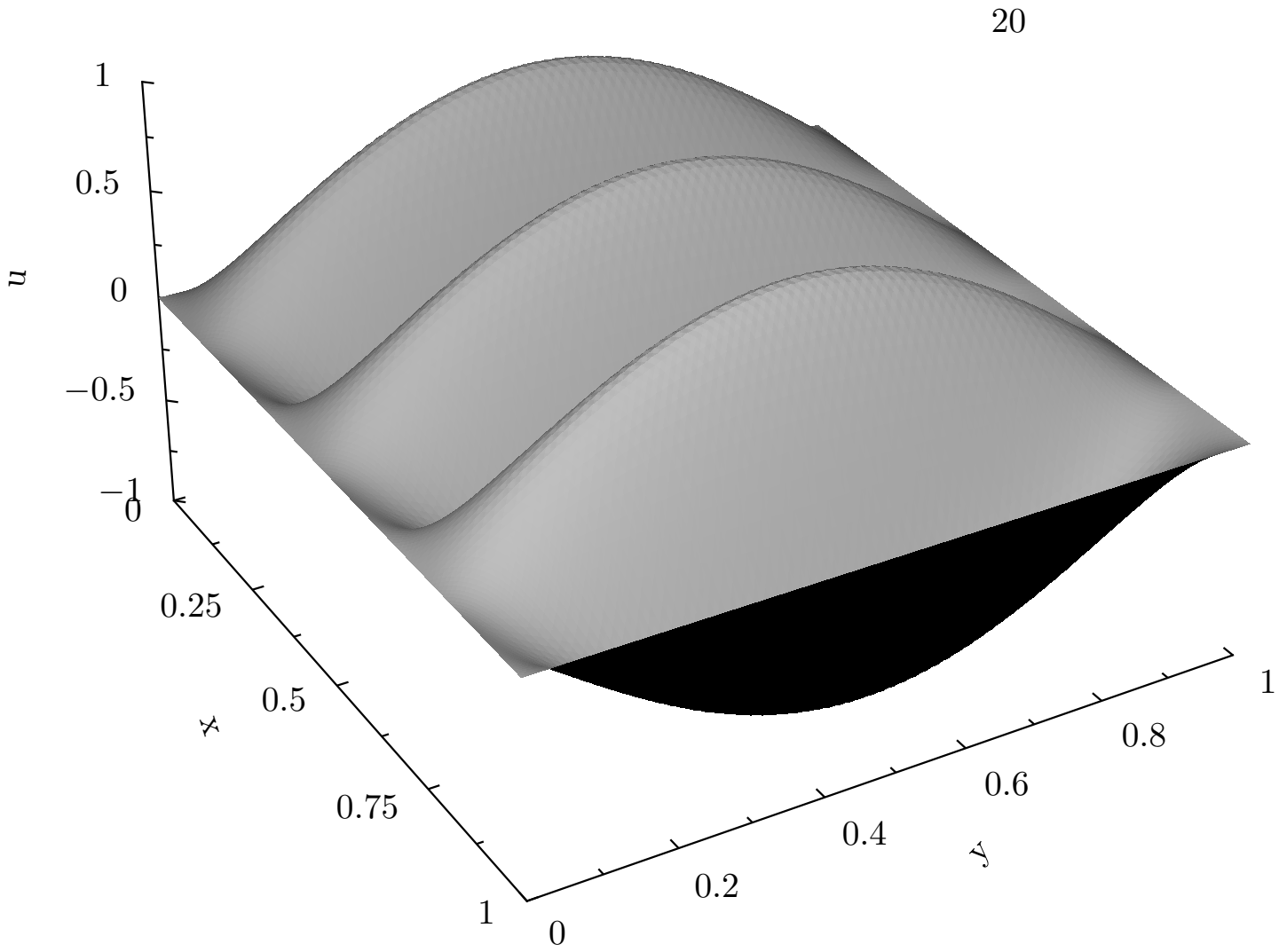
Smoothing 2D: Sine Waves



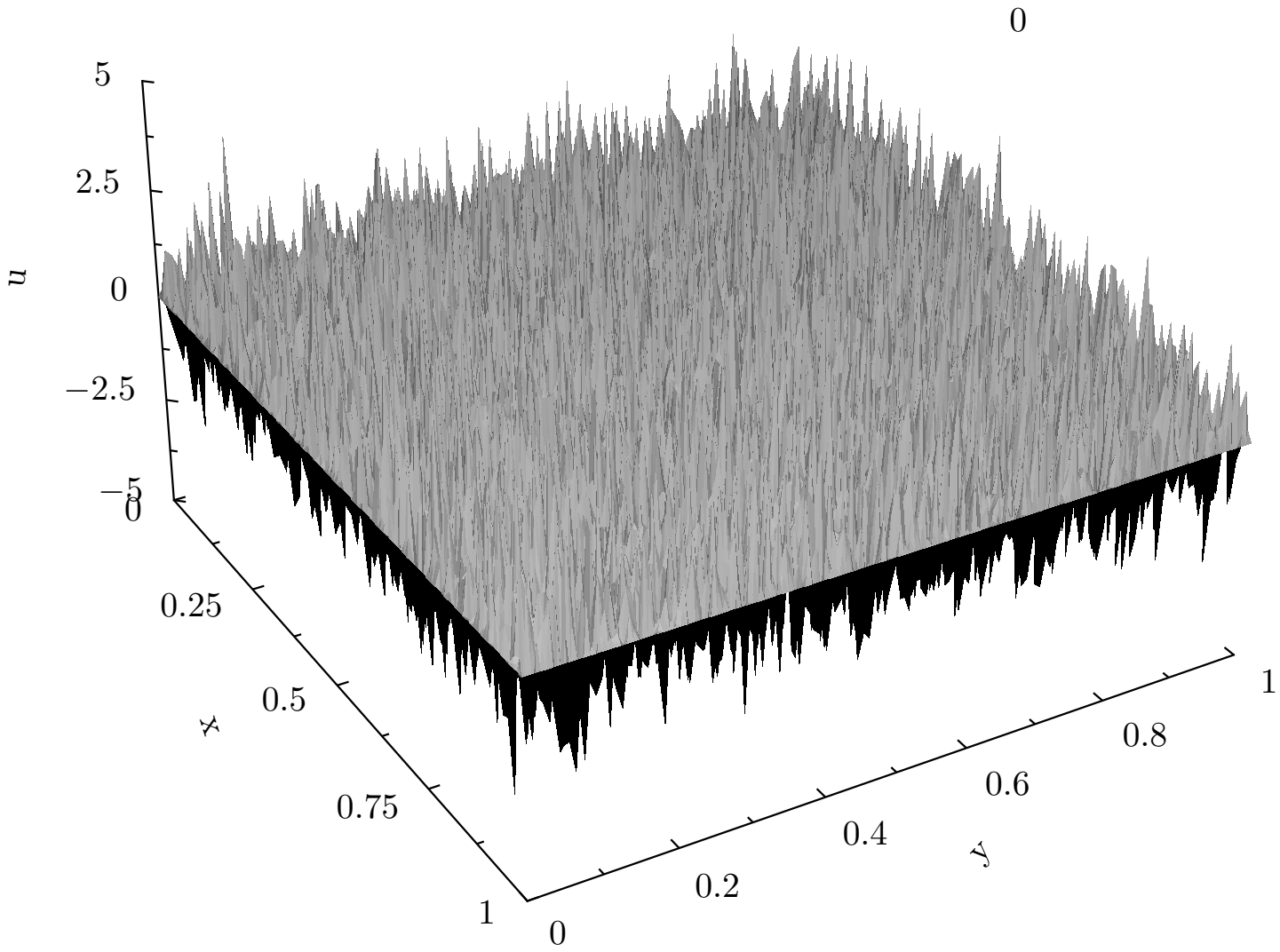
Smoothing 2D: 10 Iterations



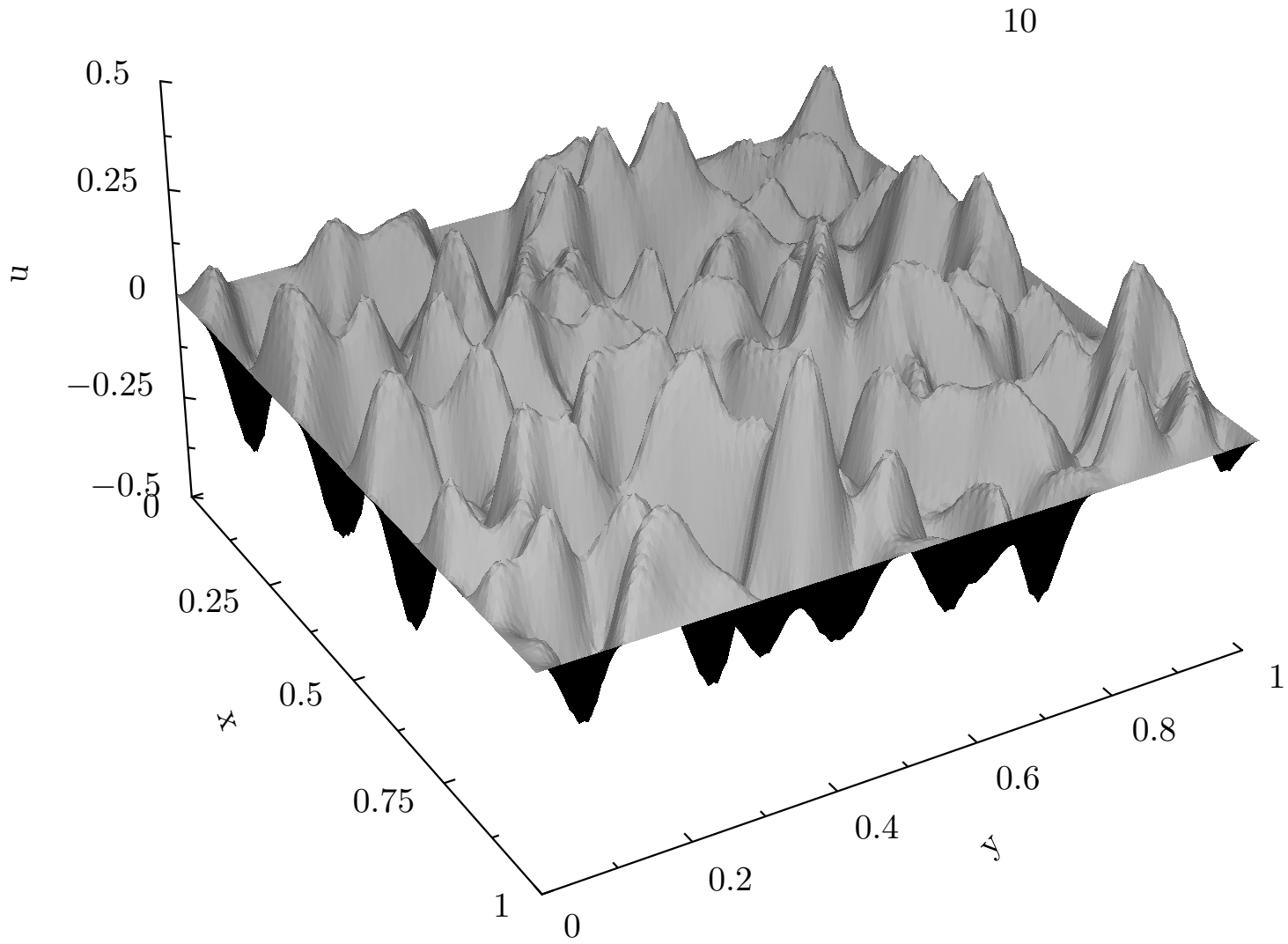
Smoothing 2D: 20 Iterations



Smoothing 2D: Random



Smoothing 2D: 10 Iterations



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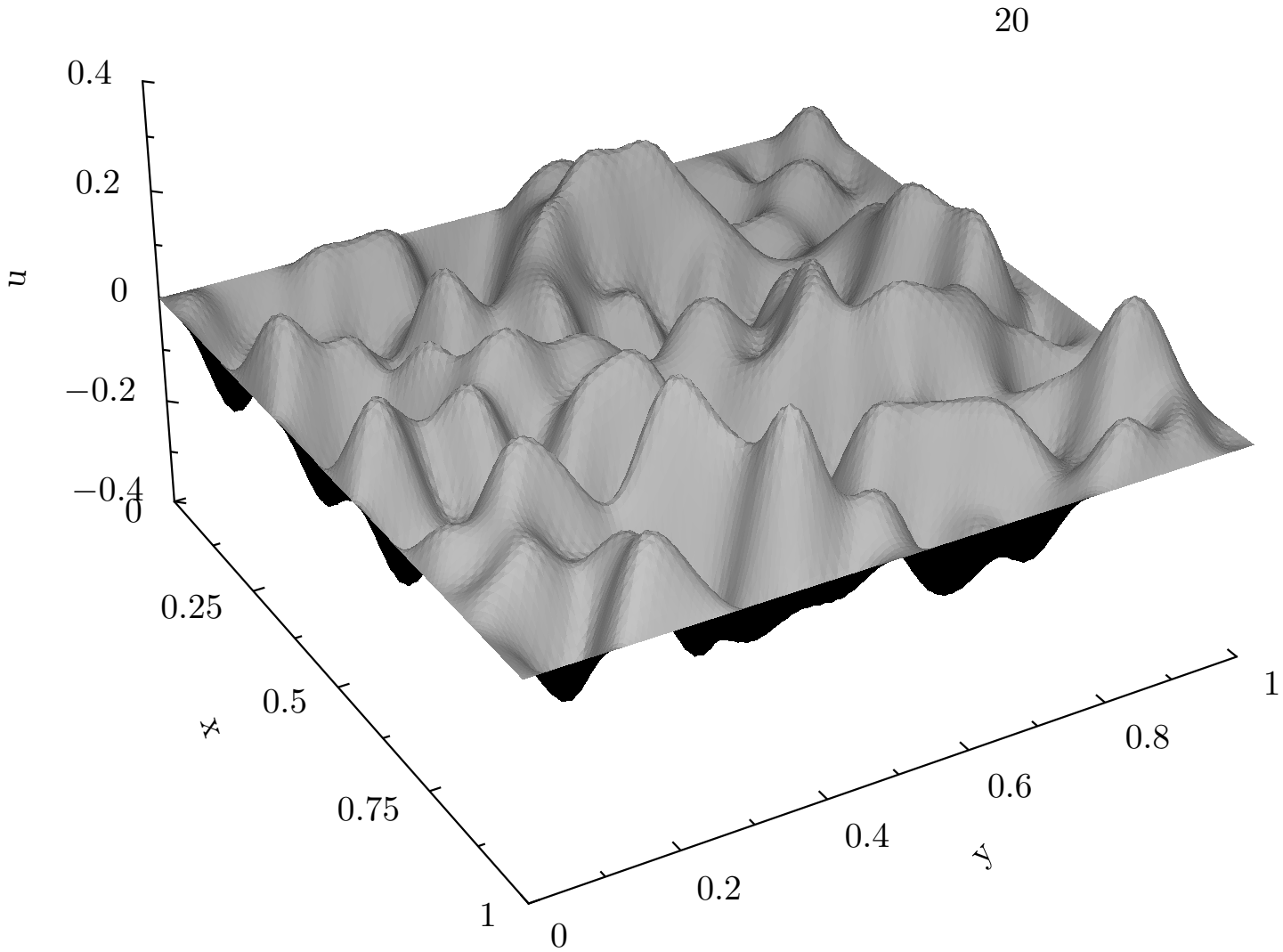
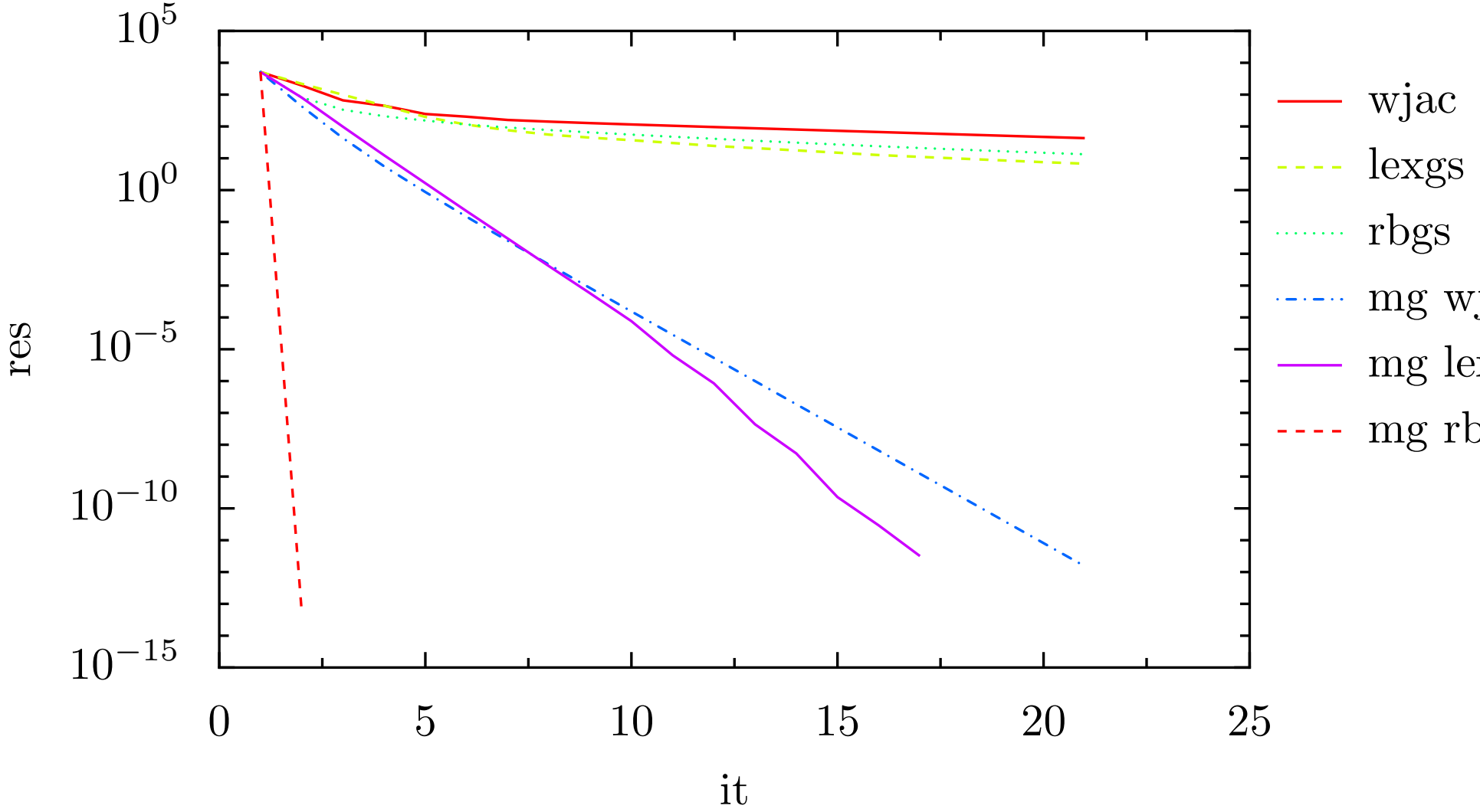
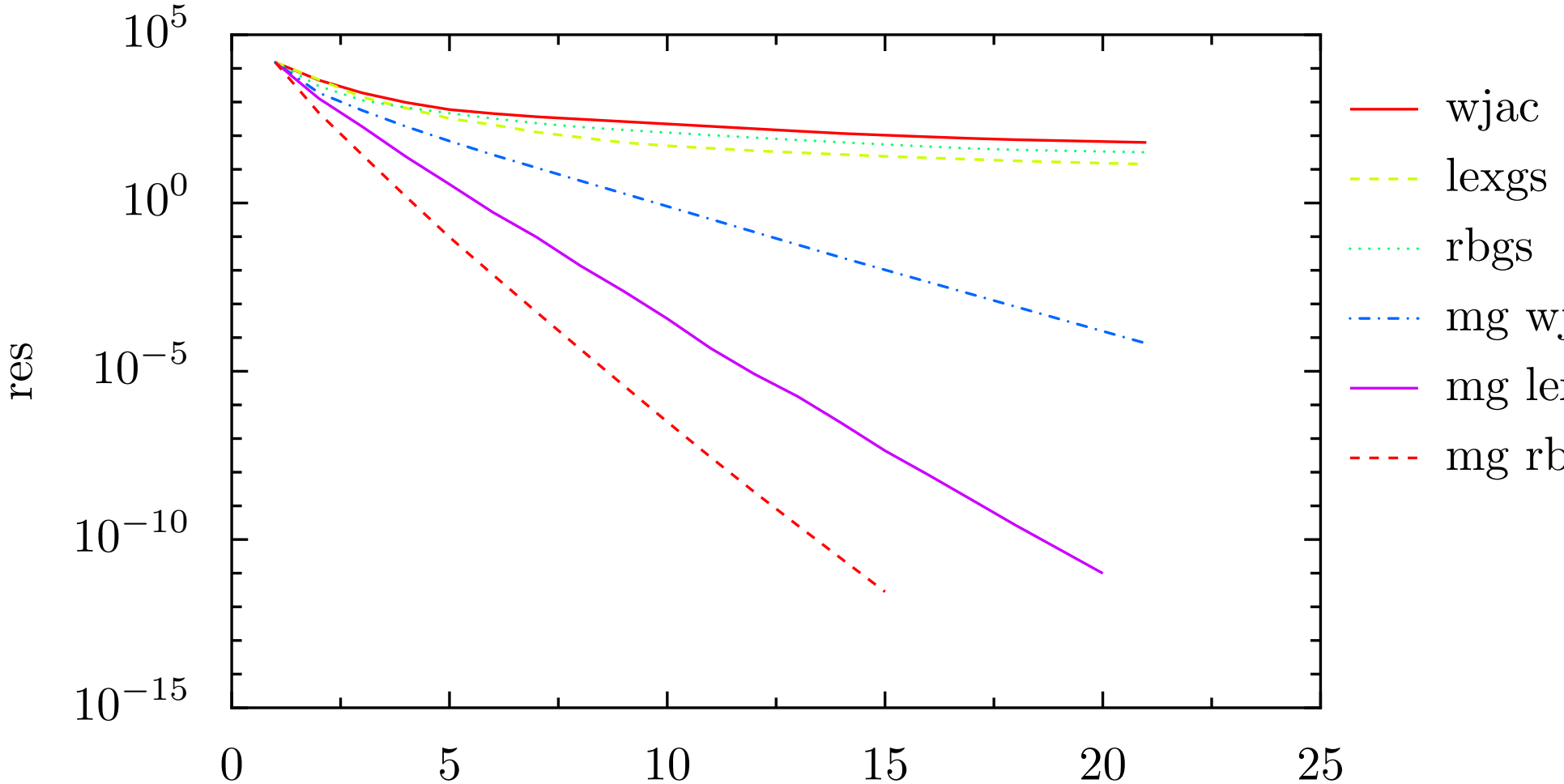


Residual Convergence 1D



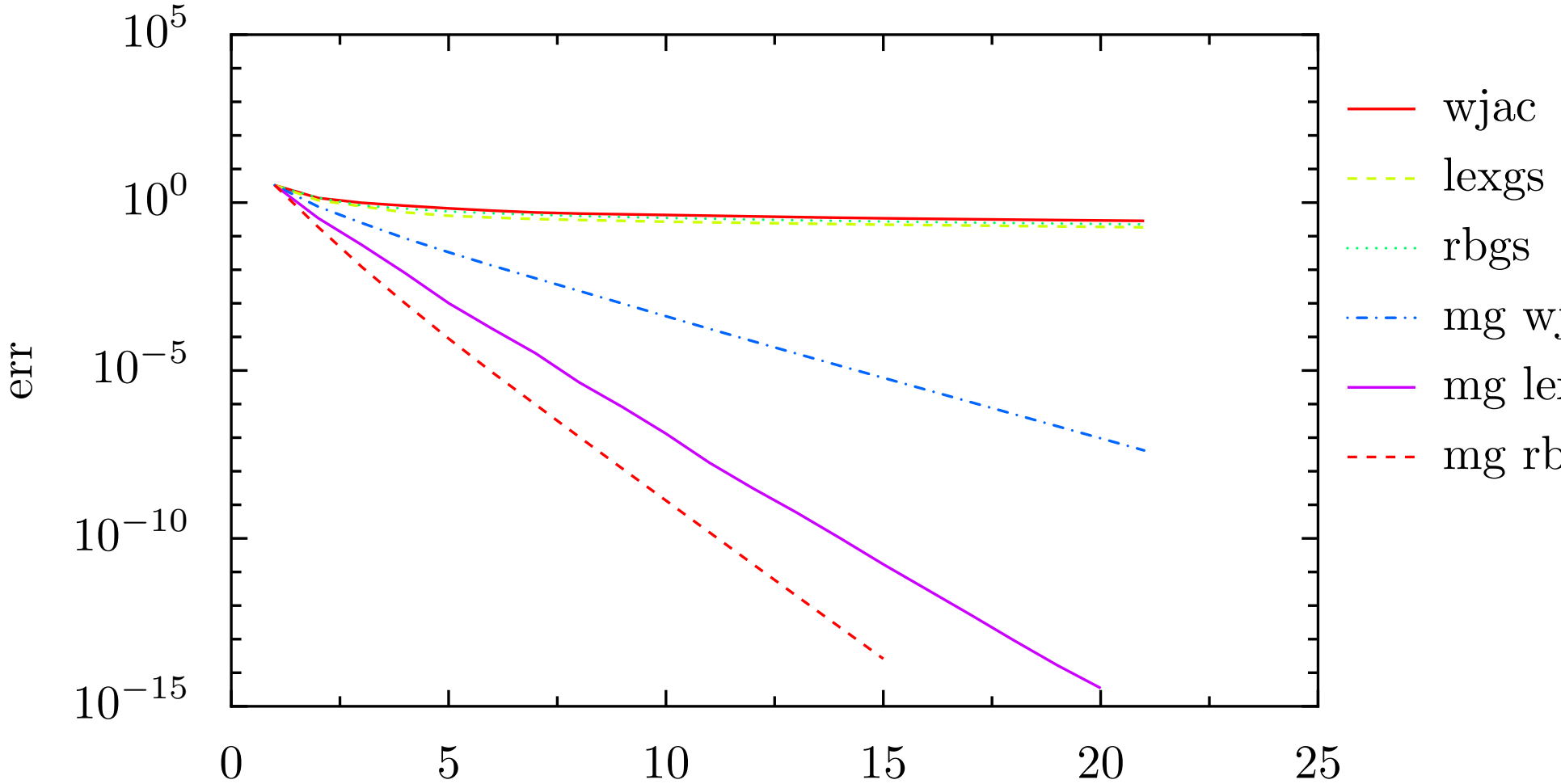
Residual Convergence 2D

$$n_x = n_y = 2^5$$



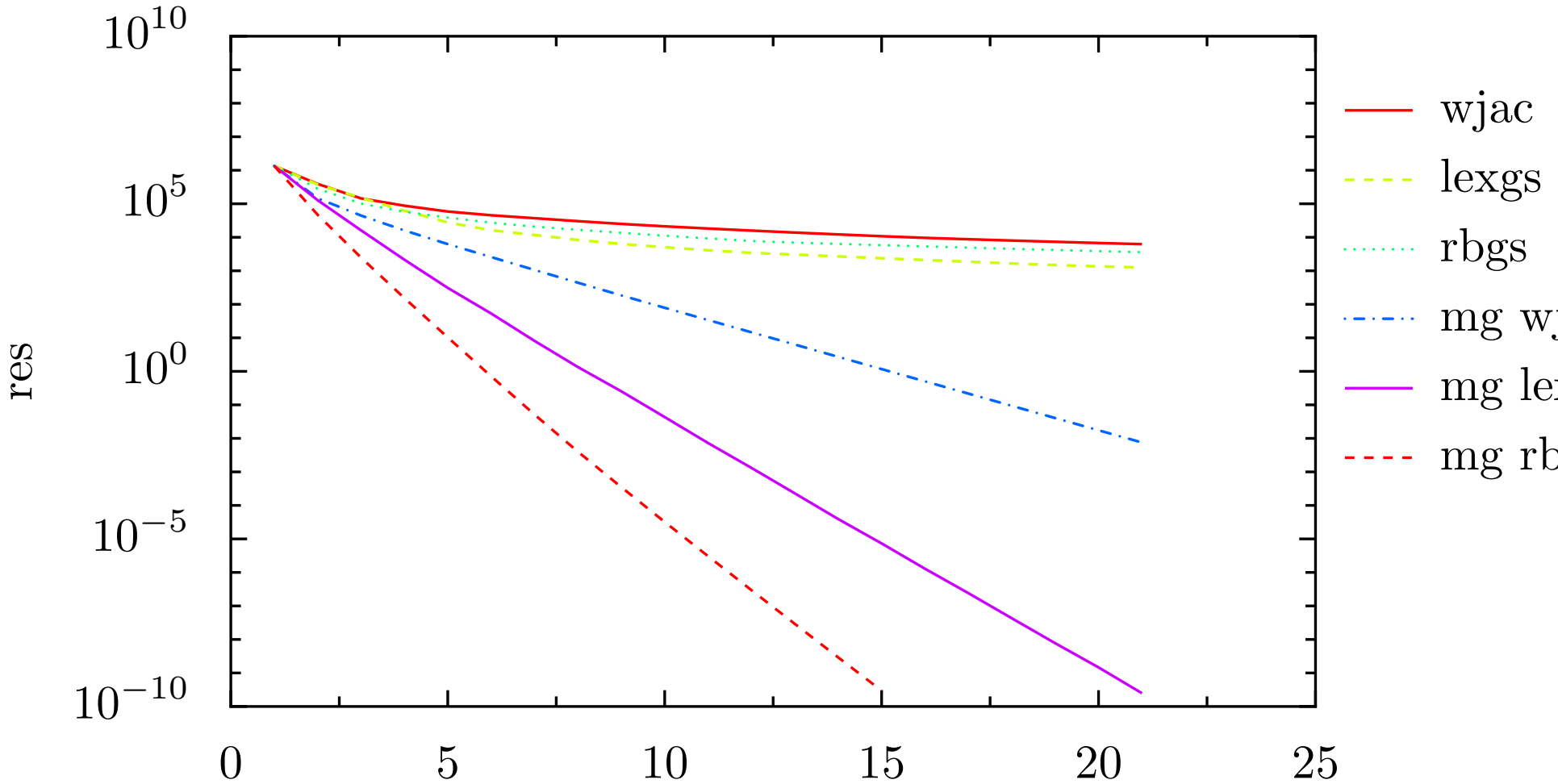
Error Convergence 2D

$$n_x = n_y = 2^5$$



Residual Convergence 2D

$$n_x = n_y = 2^8$$



Error Convergence 2D

$$n_x = n_y = 2^8$$