

An Example of the Importance of Algorithms

Poisson problem on a cube, second-order finite differences, $n \times n \times n$ mesh (Rice, 1983).

Method	flops	$n = 10$	$n = 100$	$n = 1000$
GE (1945)	n^7	.01 s	28 hrs	31,700 yrs
SOR (1954)	$8n^4 \log n$	2.7×10^{-4} s	5.4 s	21.9 hrs
ADI (1955)	$27n^3 \log^2 n$	3.0×10^{-4} s	1.2 s	44.6 min
FFT (1965)	$7n^2 \log n$	2×10^{-6} s	4.7×10^{-4} s	7.2×10^{-2} s

(assumption: 1 flop = 10^{-9} s.)