

Ex 1

Ass: $A \in \mathbb{R}^{n \times n}$, $LU \approx A$ an ILU decomposition, $b \in \mathbb{R}^n$

Solve $Ly = b$ with forward substitution parallelized

for $k=1$ to n :

$$y_k = b_k$$

(parallel) for $j=k+1$ to n :

$$b_j = b_j - l_{jk} y_k$$

end

end

Ex. 2

kij-ILU(0)

for $k=1$ to $n-1$

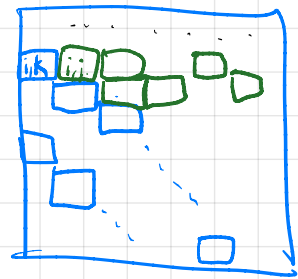
for $i=k+1$ to n and $(i,k) \notin \text{NZ}(A)$ } runs ≤ 2 times
 überschreibe $a_{ik} = a_{ik}/a_{kk}$

for $j=k+1$ to n and $(i,j) \notin \text{NZ}(A)$ } runs ≤ 4 times
 berechne $a_{ij} = a_{ij} - a_{ik}a_{kj}$

end

end

end



\Rightarrow We get at most $(n-1) \cdot 2 \cdot 4 + (n-1) \cdot 2$ FLOPS

We can parallelize at most the 8 Flops in the inner loop per elimination stage.

kij-LU

for $k=1$ to $n-1$:

for $i=k+1$ to n :

 überschreibe $a_{ik} = a_{ik}/a_{kk}$

 for $j=k+1$ to n :

 berechne $a_{ij} = a_{ij} - a_{ik}a_{kj}$

 end

end

end

\Rightarrow about $\frac{2}{3}n^3$ Flops (probably known from some lecture)

We can parallelize $(n-k)^2$ Flops in elim. stage k .