$$u_t = D u_{xx} + f(x,t) \qquad \text{på} \quad (0,1)$$

steg längd $\Rightarrow h = \frac{1}{N}$ $\quad N \Rightarrow$ antal steg
$$\searrow \Delta x$$

$$x_j = h \cdot j \quad \text{där} \quad j = 0,1,...,N$$

tid en $[0,T]$

tid steg $\Rightarrow K = \frac{T}{M} \quad \nearrow \Delta t \quad m \Rightarrow$ antal steg
$$w_j^n = u(x_j, t_n)$$
$$t_n = h \cdot K \quad \text{där} \quad n = 0,1,...,M$$

$$u_t(x_j, t_n) \approx \frac{w_j^{n+1} - w_j^n}{K} \qquad \left. \right\rangle \quad \text{euler}$$
$$\qquad \qquad \qquad \qquad \qquad \qquad \text{framåt}$$
$$w_{xx}(x_j, t_n) \approx \frac{w_{j+1}^n - 2w_j^n + w_{j-1}^n}{h^2} \quad \Big/$$

$$u_t = D u_{xx} + f(x,t)$$

$$\frac{w_j^{n+1} - w_j^n}{K} \approx D \frac{w_{j+1}^n - 2w_j^n + w_{j-1}^n}{h^2} + f(x, t^n)$$

$\qquad \qquad \qquad \overbrace{\qquad}^{} \quad$ annars får
$\qquad \qquad \qquad$ skippa kant $\qquad$ vi m+1 punkter i
$\qquad \qquad \qquad \qquad \qquad \qquad \qquad$ matlab

j nu $1, ..., \widetilde{N}-1 \qquad \quad n$ nu $0,1,...,M-1$

$$w_j^{n+1} = w_j^n + K\left(D \frac{w_{j+1}^n - 2w_j^n + w_j^n}{h^2} + f(x, t_n) \right)$$

framåt diff ordning 1 i K
central diff ordning 2 in