Nr.2

$$\varkappa_a = \|A\|_\infty \, \|A^{-1}\|_\infty$$

$$\|A\|_\infty = (1+\beta) \qquad \|A^{-1}\|_\infty = |-\tfrac{1}{\beta^n}| \sum_{i=0}^{n-1} |-\beta^i|$$

$$= \sum_{i=0}^{n-1} \frac{\beta^i}{\beta^n}$$

$$= \sum_{i=0}^{n-1} \frac{1}{\beta^{n-i}}$$

$$= \sum_{i=1}^{n} \frac{1}{\beta^i}$$

$$\varkappa(A) = (1+\beta)\left(\sum_{i=1}^{n} \frac{1}{\beta^i}\right)$$

Beschränkung unabhängig von n?

$$\lim_{n\to\infty} (1+\beta)\left(\sum_{i=1}^{n} \frac{1}{\beta^i}\right) = (1+\beta) \lim_{n\to\infty} \left(\frac{\beta^n - 1}{\beta^n(\beta-1)}\right)$$

$$= (1+\beta) \lim_{n\to\infty} \left(\frac{1 - \frac{1}{\beta^n}}{(\beta-1)}\right)$$

$$= (1+\beta)\left(\frac{1}{\beta-1} - \frac{\lim_{n\to\infty} \frac{1}{\beta^n}}{\beta-1}\right)$$

$$= \frac{1+\beta}{\beta-1}$$

//

$\varkappa(A)$ ist also unabhängig von n durch $\frac{1+\beta}{\beta-1}$ beschränkt.