

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix} : n \rightarrow A'$$

$$\det(A) = \frac{1}{n} \cdot \det(A')$$

$$\det(A) = \frac{1}{s^n} \cdot \det(s \cdot A) \rightarrow \det(s \cdot A) = s^n \cdot \det(A)$$

$$A \in K^{n \times m} \quad B, A \in K^{n \times n}$$

$$C = \underline{sB} \cdot A^{-1}$$

$$\det(C) = s^n \cdot \det(B) \cdot \det(A)^{-1}$$

$$u, v, w \in \mathbb{R}^2 \quad \varphi(u) = a \quad \varphi(v) = b$$

$$\rightarrow w = \alpha \cdot u + \beta \cdot v \rightarrow \varphi(w) = \alpha \cdot \varphi(u) + \beta \cdot \varphi(v)$$

$$w = \gamma \cdot v \rightarrow \varphi(w) = \gamma \cdot \varphi(v)$$

$$A = (a_1 \mid a_2 \mid \dots \mid a_n)$$

$$A \in K^{n \times n}$$

$\ker(A)$: Lösungsraum des homogenen LGS A

$\Rightarrow \dim(\ker(A))$ ist $\dim$ des Lösungsraums

$$\dim(\text{Bild}(\varphi_A)) + \dim(\text{Kern}(\varphi_A)) = n$$

$$U = \left\{ \begin{pmatrix} x \\ y \end{pmatrix} \mid x^2 + y^2 = 0 \right\}$$

$$V = \underline{k}^2 \quad \mathbb{C}^2$$

$$\underline{a} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} a \\ c \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} \in U \quad \underline{a} \in k$$

$$\begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} c \\ 1 \end{pmatrix} \in U$$

$$\underline{x^2 = -y^2} \quad x, y = 0, x, y \in \mathbb{R}$$

$$x, y \in \mathbb{C}$$

$$\left\langle \begin{pmatrix} 1 \\ i \end{pmatrix} \right\rangle \quad \underline{a} \cdot \begin{pmatrix} 1 \\ i \end{pmatrix} = \underline{a} \quad (a^2 + ki)^2 = a^2 - a^2 = 0$$

$$G := \{ f \mid f(x) = f(-x) \}$$

$$U := \{ f \mid f(x) = -f(-x) \}$$

$$G \cap U$$

$$f(x) = f(-x) = -f(-x)$$

$$\Rightarrow f(-x) = 0 \quad \forall x$$

$$\Rightarrow G \cap U = \{0\}$$

$$G+U = \{f \in G, g \in U\}$$

$$f+g \in G+U$$

$$G+U = \text{Abb}(\mathbb{R}, \mathbb{R})$$

$$\text{Abb}(\mathbb{R}, \mathbb{R}) \subseteq G+U$$

$$h \in \text{Abb}(\mathbb{R}, \mathbb{R})$$

$$f: h(x) - h(-x), f \in G$$

$$g \in U: h = f+g$$

$$g(x) = \frac{1}{2}(h(x) + h(-x)) + \frac{1}{2}(h(x) - h(-x)) = \frac{1}{2}f(x) + \frac{1}{2}h(x)$$

$$T_{B'}^{B'}$$

$$\underline{M_C^B(\varphi)}$$

$$M_{C'}^{B'}(\varphi) = \underline{T_{C'}^C} \cdot M_C^B(\varphi) \cdot T_B^{B'} \cdot \underline{V_{B'}^C} = \begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$$

$$V_B = 1 \cdot \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} + 1 \cdot \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}$$

$$\{x^2, x, 1\}$$

$$\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} \hat{=} x^2 + x + 0$$

$$B' = \left\{ \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \right\}$$

$$\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} \hat{=} 1 \cdot \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} + 1 \cdot \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} + 0 \cdot \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix} \cdot v_{B'} = v_B$$

$$\uparrow$$

$$T_{B'}^B$$

$$\langle 2(v+u), w \rangle = 2 \cdot (\langle v, w \rangle + \langle u, w \rangle)$$

$$A = \begin{pmatrix} s & \eta \\ \eta & -2 \end{pmatrix}$$

$$\underline{S^T A S} = D \quad S \in O(n)$$

$$\underline{S^{-1}} = S^T$$

$$E_{\lambda_1} = \underline{\langle v \rangle}$$

$$\underline{E_{\lambda_1}} = \underline{\langle u \rangle} \quad \langle v, u \rangle = 0$$

$$t_{1,3} = \langle v \rangle$$

$$v \times u = u$$