$S = S^{\perp\perp}, \; T = T^{\perp\perp} \qquad (X \cup Y)^{\perp} = X^{\perp} \cap Y^{\perp}$

$(S \cap T)^{\perp} = (S^{\perp\perp} \cap T^{\perp\perp})^{\perp} =$

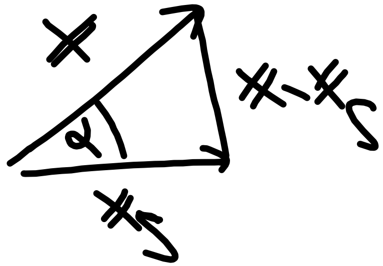
$= (S^{\perp} \cup T^{\perp})^{\perp\perp} = ([S^{\perp} \cup T^{\perp}])^{\perp\perp}$

$= S^{\perp} + T^{\perp}$

$x \qquad S$

$x_S \in S \qquad x - x_S \perp S$

$\in S^{\perp}$



$$x_S \in S \qquad x_S = c_1 u_1 + \dots + c_k u_k$$

$$x - x_S \perp u_i \quad 1 \le i \le k$$

$$\left\langle x - \sum_{j=1}^{k} c_j u_j, u_i \right\rangle = 0$$

$$\langle x, u_i \rangle - \sum_{j=1}^{k} c_j \langle u_j, u_i \rangle = 0$$

$$\left(\langle u_1, u_i \rangle, \dots, \langle u_k, u_i \rangle \right) \begin{pmatrix} c_1 \\ \vdots \\ c_k \end{pmatrix} = \langle x, u_i \rangle$$

$$n_i\,(G(\alpha))^{\perp}\cdot c = \langle x, u_i\rangle$$

$$n_i\,(G(\alpha))\,c = \langle x, u_i\rangle$$

$$G(\alpha)\,c = \langle x, \alpha\rangle^{T}$$

$$G(A) = (\langle u_i, u_j \rangle) = A^T \cdot A$$

$$r_i(A)^T \cdot r_j(A) \qquad \underline{\text{regulární}}$$

$$C = G(A)^{-1} \langle x, A \rangle^T \qquad , B$$

$$y = A\, G(A)^{-1} \langle x, A \rangle^T = A\,(A^T \cdot A)^{-1} A^T x$$

$$\operatorname{dist}(M, N) = \inf\left\{ \|x - y\| ;\ \begin{array}{l} x \in M \\ y \in N \end{array} \right\}$$

$$\boxed{\begin{array}{l} x = p + u \\ u \in \operatorname{Dir} M \\ y = q + v \\ v \in \operatorname{Dir} N \end{array}} \quad = \inf\left\{ \|(p + u) - (q + v)\| ;\ u \in \operatorname{Dir} M,\ v \in \operatorname{Dir} N \right\}$$

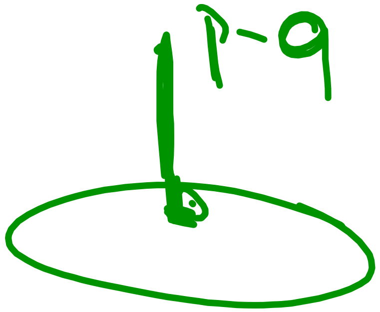
$$= \inf\left\{ \|(p - q) - \underbrace{(v - u)}_{w}\| ;\ u \ldots,\ v \in \right\}$$

$$= \inf\left\{ \|(p - q) - w\| ;\ w \in \operatorname{Dir} M + \operatorname{Dir} N \right\}$$

$$= \operatorname{dist}(p - q, \operatorname{Dir} M + \operatorname{Dir} N)$$

p, q příčka

$$\frac{p-q \perp (\mathrm{Dir}\,M + \mathrm{Dir}\,N)}{(p+u)-(q+v) \perp \mathrm{Dir}\,M + \mathrm{Dir}\,N}$$



$$(p-q)^{\parallel} - (\underline{\underline{v-u}})$$

$$\operatorname{dist}(M,N) = 0 \Rightarrow M \cap N \neq \emptyset$$

$$\| $$

$$\inf\{\|x-y\|;\ x \in M,\ y \in N\}$$

$$= \min\{\|x-y\|;\ x \in M,\ y \in N\}$$

$$= \|p-q\| \Rightarrow \underset{\in M}{p} = \underset{\in N}{q}$$

$$\measuredangle(S,T) = \measuredangle(S_1,T_1) =$$

$$= \inf \{ \measuredangle(x,y),\ x,y \neq 0,$$

$$\text{VI} \quad x \in \underbrace{S \cap (S\cap T)^\perp}_{\cap_1},\ y \in \underline{T \cap (S\cap T)^\perp} \}$$

$$\inf \{ \measuredangle(x,T),\ 0 \neq x,\ x \in S \cap (S\cap T)^\perp \}$$

$$R \leq \measuredangle(S,T) \qquad R = \sup \arccos \frac{\|x_T\|}{\|x\|} \}$$

$\therefore$

$$S \quad r_1(A), \ldots, r_m(A)$$

$$- \quad Ax = b \notin S$$

$$Ax_0 = b_S \in S \quad , c$$

$$b_S = (r_1(A), \ldots, r_m(A)) \begin{pmatrix} c_1 \\ \vdots \\ c_m \end{pmatrix}$$

$$\underline{\underline{\bar{A}^T A c = \bar{A}^T \cdot b}}$$