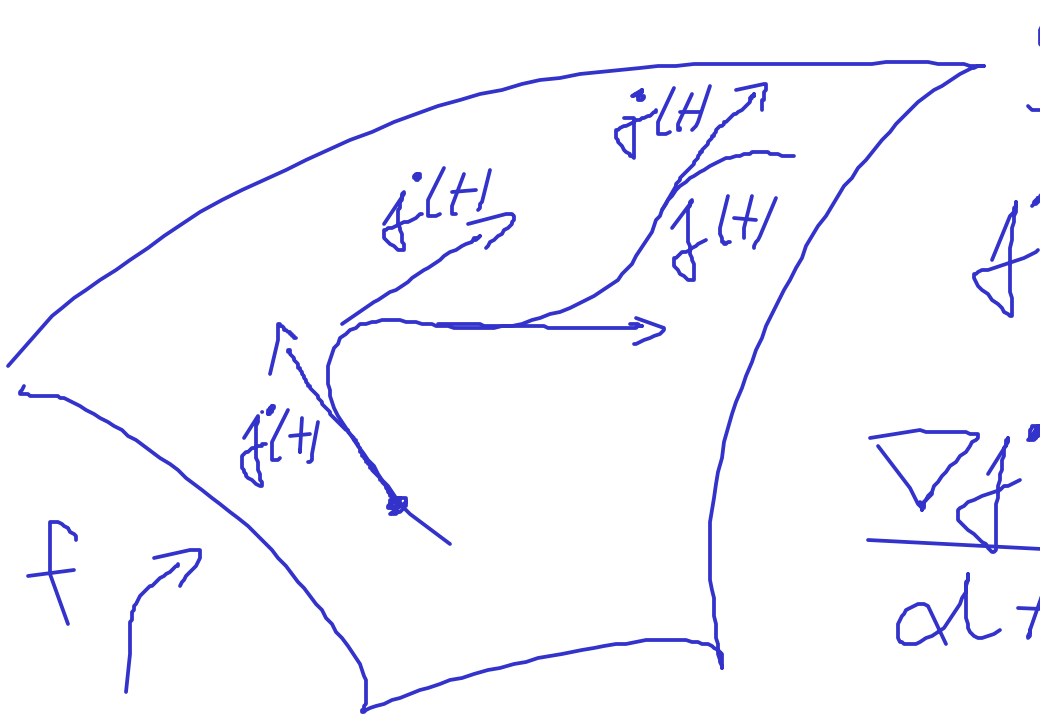

$$\dot{f}(t) = \frac{df(t)}{dt}$$

$$\frac{\nabla \dot{f}(t)}{dt} = 0$$

$(u_1(t), u_2(t))$

$f(t) = f(u_1(t), u_2(t))$

rovnice charakterizující geodetické čáry

Vrovině: $\frac{\nabla \dot{f}(t)}{dt} = \frac{d\dot{f}(t)}{dt} = 0$

$\Rightarrow \quad \dot{f}(t) = \frac{df(t)}{dt} = a$

$f(t) = at + b$

Na obecné ploše

$$f(t) = f(u_1(t), u_2(t)) \quad / \frac{d}{dt}$$

$$f'(t) = \underbrace{\frac{du_1}{dt}}_{v_1(t)} \cdot f_1 + \underbrace{\frac{du_2}{dt}}_{v_2(t)} \cdot f_2 \quad / \nabla$$

Reparametrizace: $t = \varphi(\tilde{\tau})$

$$\frac{du_i}{d\tilde{\tau}} = \frac{du_i}{dt} \cdot \frac{d\varphi}{d\tilde{\tau}}$$

$$\frac{du_i}{d\tilde{\tau}} \cdot \frac{du_j}{d\tilde{\tau}} = \left(\frac{du_i}{dt} \cdot \frac{du_j}{dt}\right)\left(\frac{d\varphi}{d\tilde{\tau}}\right)^2$$

$$\frac{d^2 u_i}{d\tilde{\tau}^2} = \frac{d}{d\tilde{\tau}}\left(\frac{du_i}{dt} \cdot \frac{d\varphi}{d\tilde{\tau}}\right)$$

$$= \left(\frac{d^2 u_i}{dt^2} \cdot \frac{d\varphi}{d\tilde{\tau}}\right) \cdot \frac{d\varphi}{dt} + \dots$$

$$+ \frac{du}{dt} \frac{d\varphi}{d\tau} \cdot \frac{d^2\varphi}{d^2 t}$$

Specialni primer:

$$\varphi(\tau) = a\tau + b$$

14.1

$$g_{11} = u_2^2 + 1$$

$$g_{12} = 0$$

$$g_{22} = 1$$

$$\begin{pmatrix} u_2^2+1 & 0 \\ 0 & 1 \end{pmatrix} = (g_{ij})$$

$$\begin{pmatrix} \dfrac{1}{a_2^2+1} & 0 \\ 0 & 1 \end{pmatrix} = \left(\tilde{g}_{ij} \right)$$

(30) $j = k = 1$

$$\left(\Gamma^1_{11}, \Gamma^2_{11} \right) = \left(\Gamma_{111}, \Gamma_{112} \right) \begin{pmatrix} \tilde{g}^{11} & \tilde{g}^{12} \\ \tilde{g}^{21} & \tilde{g}^{22} \end{pmatrix}$$