$\tilde{f} : M \longrightarrow \Gamma_f \subset M \times M$.

$[\tilde{f}_*(v_i)]_{i=1}^n$ is an orientation of Γ_f when $[v_i]$ is an orientation of M. ◻

Let p be a fixed point of f, $x_1, \cdots x_n$ an oriented coordinate system for M centered around p; take as coordinates around $(p, p) \in M \times M$ the functions

$$y_i = \pi_1^* x_i \quad \text{and} \quad z_i = \pi_2^* x_i .$$

An oriented basis for $T_{(p,p)}(\Delta) \subset T_{(p,p)}(M \times M)$ is then given by

$$\Delta_*\left(\frac{\partial}{\partial x_1}, \cdots \frac{\partial}{\partial x_n}\right) = \left(\frac{\partial}{\partial y_1} + \frac{\partial}{\partial z_1}, \cdots\cdots \frac{\partial}{\partial y_n} + \frac{\partial}{\partial z_n}\right),$$

where Δ is the diagonal map $x \longmapsto (x, x)$, and an oriented basis for $T_{(p,p)}(\Gamma_f) \subset T_{(p,p)}(M \times M)$ is given by

$$\tilde{f}_*\left(\frac{\partial}{\partial x_1} \cdots \frac{\partial}{\partial x_n}\right) = \left(\frac{\partial}{\partial y_1} + \sum \frac{\partial f_i}{\partial x_1} \cdot \frac{\partial}{\partial z_i}, \cdots \quad \frac{\partial}{\partial y_n} + \sum \frac{\partial f}{\partial x_n} \cdot \frac{\partial}{\partial z_i}\right).$$

Γ

$$\Delta : \mathbb{R}^2 \longrightarrow \mathbb{R}^2 \times \mathbb{R}^2$$

$$(x_1, x_2) \longmapsto (x_1, x_2, x_1, x_2)$$

$$\Delta_*\left(\frac{\partial}{\partial x_1}\right) = \frac{\partial}{\partial y_1} + \frac{\partial}{\partial z_1} \quad \cdots$$

$$\tilde{f} : \mathbb{R}^2 \longrightarrow \mathbb{R}^2 \times \mathbb{R}^2$$

$$(x_1, x_2) \longmapsto (x_1, x_2, f_1(x_1, x_2), f_2(x_1, x_2))$$

$$\tilde{f}_*\left(\frac{\partial}{\partial x_1}\right) = \frac{\partial}{\partial y_1} + \frac{\partial f_1}{\partial x_1}\frac{\partial}{\partial z_1} + \frac{\partial f_{n1}}{\partial x_1}\frac{\partial}{\partial z_2}$$

$$\begin{pmatrix} 1, & 0 \\ 0, & 1 \\ \frac{\partial f_1}{\partial x_1} & \frac{\partial f_1}{\partial x_2} \\ \frac{\partial f_2}{\partial x_1}, & \frac{\partial f_2}{\partial x_2} \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ \frac{\partial f_1}{\partial x_1} \\ \frac{\partial f_2}{\partial x_1} \end{pmatrix} \quad \cdots$$

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