The cohomology class defined by T_Z together with the isomorphism

$$H^*_{DR}(M) \cong H^*(\mathcal{D}^*(M), d)$$

is the fundamental class of Z.

pf

$$0 \longrightarrow \mathbb{R} \longrightarrow \mathcal{D}^0 \xrightarrow{d} \mathcal{D}^1 \xrightarrow{d} \mathcal{D}^2 \longrightarrow \mathcal{D}^3 \longrightarrow$$

$$\Rightarrow \quad H^q_{DR}(M) \cong \check{H}^q(M, \mathbb{R}) \cong \frac{H^0(M, \ker d)}{d\, H^0(M, \mathcal{D}^{q-1})}$$

$$= \frac{\ker d\,(M)}{d\,\mathcal{D}^{p-1}(M)} = H^q(\mathcal{D}^*(M), d).$$

$$\begin{array}{ccc} H^q_{DR}(M) & \longleftrightarrow & H^q(\mathcal{D}^*(M), d) \\ \Downarrow & & \Downarrow \\ \varphi & \longmapsto & T_\varphi \end{array}$$

defined by

$$T_\varphi(\phi) = \int_M \varphi \wedge \phi, \quad \phi \in A_c^{n-q}(M)$$

$T_Z \in \mathcal{D}^{p,p} \Rightarrow dT_Z = 0$, and T_Z is positive.

$\Rightarrow T_Z \in H^{2p}(\mathcal{D}^*(M), d)$

$$\begin{array}{ccccc} H_{2(n-p)}(M) & \longleftrightarrow & H^{2p}_{DR}(M) & \longleftrightarrow & H^{2p}(\mathcal{D}^*(M), d) \\ \Downarrow & & \Downarrow & & \\ [Z] & \longleftrightarrow & \phi_Z & \longrightarrow & T_{\phi_Z} = T_Z \end{array}$$

where $T_{\phi_Z}(\varphi) = \int_M \phi_Z \wedge \varphi$, & $T_Z = \int_{Z^*} \varphi$. P60~P61

2. A smooth (1,1) form