D na $\mathcal{A}M$

∇ na TM $\quad T^{a}{}_{mn}$

D rozšíření D na TM

$$D(A\otimes\phi) = \underbrace{(DA)}_{\nabla A}\otimes\phi + A\otimes\underbrace{(D\phi)}_{D\phi}$$

$$A \in TM, \quad \phi \in \mathcal{A}M$$

$${}^{D}d_{a_0}\phi^{A}{}_{a_1\ldots a_p} = D_{a_0}\wedge\phi^{A}{}_{a_1\ldots a_p} + T^{n}{}_{a_0a_1}\wedge\phi^{A}{}_{|n|a_2\ldots a_p}$$

$$= (p+1)\,D_{[a_0}\phi^{A}{}_{a_1\ldots a_p]} + \binom{p+1}{2}T^{n}{}_{[a_0a_1}\phi^{A}{}_{|n|a_2\ldots a_p]}$$

$\Lambda^p\otimes\mathcal{A}^k_l M$

$\Lambda^p\otimes T^k_l M$

$d \quad \nabla$

$${}^{\nabla}d_{a_0}\omega_{a_1\ldots a_p}{}^{m\ldots}{}_{n\ldots} = \nabla_{a_0}\wedge\omega_{a_1\ldots a_p}{}^{m}{}_{n} + T^{k}{}_{a_0a_1}\wedge\omega_{|k|a_2\ldots a_p}{}^{m}{}_{n}$$

$$\delta^m_a \in \Lambda^1\otimes TM$$

$${}^{\nabla}d_a\delta^m_b = \underbrace{\nabla_a\wedge\delta^m_b}_{0} + T^k_{ab}\,\delta^m_k = T^m_{ab}$$

$$\nabla = \partial + \Gamma \qquad \Gamma^m_{an} \in \Lambda^1\otimes T^1_1 M$$

$$R_{ab}{}^m{}_n \in \Lambda^2\otimes T^1_1 M$$

$$R_{ab}{}^m{}_n = {}^{\partial}d_a\Gamma^m_{bn} + [\Gamma_a,\Gamma_b]^m{}_n$$

$$= \partial_a\Gamma^m_{bn} - \partial_b\Gamma^m_{an} + \underbrace{\Gamma^m_{ak}\Gamma^k_{bn} - \Gamma^m_{bk}\Gamma^k_{an}}_{\Gamma_a\wedge\Gamma_b}$$

$${}^{\nabla}d R = 0 \qquad T = 0$$

$$\Downarrow$$

$$\nabla\wedge R = 0$$

$$\nabla_{[a}R_{bc]}{}^m{}_n = 0$$

$$\Lambda^p \otimes A^k_l M$$

$$\Lambda^p \otimes T^k_l M$$

$$d \qquad \nabla$$

$$\overset{\nabla}{d}_{\underline{a}_0} \omega_{\underline{a}_1 \ldots \underline{a}_p \, \underline{n} \ldots}^{\qquad \underline{m} \ldots} = \nabla_{\underline{a}_0} \wedge \omega_{\underline{a}_1 \ldots \underline{a}_p \underline{n}}^{\underline{k}} + T_{\underline{a}_0 \underline{a}_1}^{\underline{k}} \wedge \omega_{\underline{k} | \underline{a}_2 \ldots \underline{a}_p \underline{n}}^{\underline{m}}$$

$$d \qquad \nabla$$

$$\overset{\nabla}{d}_{\underline{a}_0} \omega_{\underline{a}_1 \cdots \underline{a}_p \, \underline{n} \cdots}^{\underline{m} \cdots} = \nabla_{\underline{a}_0} \wedge \omega_{\underline{a}_1 \cdots \underline{a}_p \underline{n}}^{\underline{k}} + T_{\underline{a}_0 \underline{a}_1}^{\underline{k}} \wedge \omega_{|\underline{k}| \underline{a}_2 \cdots \underline{a}_p \underline{n}}^{\underline{m}}$$

$$\delta_{\underline{a}}^{\underline{m}} \in \Lambda^1 \otimes TM$$

$$\overset{\nabla}{d}_{\underline{a}} \delta_{\underline{b}}^{\underline{m}} = \underbrace{\nabla_{\underline{a}} \wedge \delta_{\underline{b}}^{\underline{m}}}_{0} + T_{\underline{ab}}^{\underline{k}} \delta_{\underline{k}}^{\underline{m}} = T_{\underline{ab}}^{\underline{m}}$$

$$\nabla = \partial + \Gamma \qquad \Gamma_{a}{}^{m}{}_{n} \in \Lambda^1 \otimes T^1_1 M$$

$$R_{ab}{}^{m}{}_{n} \in \Lambda^2 \otimes T^1_1 M$$

$$R_{ab}{}^{m}{}_{n} = \partial_{a} \Gamma_{b}{}^{m}{}_{n} + [\Gamma_{a}, \Gamma_{b}]^{m}{}_{n}$$

$$= \partial_{a} \Gamma_{b}{}^{m}{}_{n} - \partial_{b} \Gamma_{a}{}^{m}{}_{n} + \underbrace{\Gamma_{a}{}^{m}{}_{k} \Gamma_{b}{}^{k}{}_{n} - \Gamma_{b}{}^{m}{}_{k} \Gamma_{a}{}^{k}{}_{n}}_{\Gamma_{a} \wedge \Gamma_{b}}$$

$$\nabla = \partial + \Gamma \qquad \Gamma_{\underline{a}\,\underline{n}}{}^{\underline{m}} \in \Lambda^1 \otimes T^1_1 M$$

$$R_{\underline{a}\underline{b}}{}^{\underline{m}}{}_{\underline{n}} \in \Lambda^2 \otimes T^1_1 M$$

$$\overset{\nabla}{d} R = 0 \qquad T = 0$$

$$\Downarrow$$

$$\nabla \wedge R = 0$$

$$\nabla_{[\underline{a}} R_{\underline{b}\underline{c}]}{}^{\underline{m}}{}_{\underline{n}} = 0$$