

$$d_0 \varphi = \sum_{\#I=p} d_y \eta_I \wedge dx_I,$$

where d_y is the exterior derivative in the F -direction relative to the product decomposition.

$$\Gamma \quad d_0 \varphi = d_0 \left(\sum_{\#I=p} \eta_I(x, y, dy) \wedge dx_I \right) \in E_0^{p, q+1}$$

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$$\sum_{\#I=p} d \eta_I \wedge dx_I = \sum_{\#I=p} (d_x \eta_I + d_y \eta_I) \wedge dx_I$$

$$= \sum_{\#I=p} d_y \eta_I \wedge dx_I + \sum_{\#I=p} d_x \eta_I \wedge dx_I$$

$$\Rightarrow \text{Since } \sum_{\#I=p} d_x \eta_I \wedge dx_I = \sum_{\#I=p+1} \eta_I \wedge dx_I,$$

$$d_0 \varphi \equiv \sum_{\#I=p} d_y \eta_I \wedge dx_I \pmod{F^{p+1} A^*}. \quad \Rightarrow$$

It follows that elements of $E_0^{p, q}$ are locally represented by

$$\bar{\varphi} = \sum_{\#I=p} \bar{\eta}_I \wedge dx_I,$$

where $\bar{\eta}_I(x, y, dy) \in H_{DR}^q(F_x)$.

$$\begin{array}{ccc} \Gamma & E_0^{p, q} & \longrightarrow E_0^{p, q+1} \\ & // & // \\ & \frac{F^p A^{p+q}}{F^{p+1} A^{p+q}} & \frac{F^p A^{p+q+1}}{F^{p+1} A^{p+q+1}} \\ & \downarrow & \\ & \sum_{\#I=p} \eta_I \wedge dx_I + F^{p+1} A^{p+q} & \longrightarrow \sum_{\#I=p} d_y \eta_I \wedge dx_I + F^{p+1} A^{p+q+1} \end{array}$$

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