

See p 42.

Claim  $H^p(M, \mathcal{Q}^{r,s}(E)) = 0$  for  $p > 0$ .

pf) Given any locally finite cover  $\mathcal{U} = \{U_\alpha\}_{\alpha \in I}$  of  $M$ , we can find a partition of unity subordinate to  $\mathcal{U}$ ; i.e.

$C^\infty$ -functions  $\rho_\alpha$  on  $M$  s.t.  $\sum \rho_\alpha \equiv 1$  and  $\text{supp}(\rho_\alpha) \subset U_\alpha$ .

Now given  $\sigma \in Z^p(\mathcal{U}, \mathcal{Q}^{r,s}(E))$ , we define  $\tau \in C^{p-1}(\mathcal{U}, \mathcal{Q}^{r,s}(E))$  by setting.

$$\tau_{\alpha_0 \dots \alpha_{p-1}} = \sum_{\beta \in I} \rho_\beta \sigma_{\beta, \alpha_0 \dots \alpha_{p-1}},$$

where the section  $\rho_\beta \sigma_{\beta, \alpha_0 \dots \alpha_{p-1}}$  extends to  $U_\beta \cap \dots \cap U_{\alpha_{p-1}}$  by zero; one verifies that  $\delta\tau = \sigma$ .

In the case  $p=1$ , explicitly:

$$\sigma = \{ \sigma_{uv} \in \mathcal{Q}^{r,s}(E)(U \cap V) \};$$

$$\sigma_{uv} + \sigma_{vw} + \sigma_{wu} = 0 \quad \text{in } U \cap V \cap W.$$

Set  $\tau_u = \sum_v \rho_v \sigma_{vu}$ ; then

$$\begin{aligned} (\delta\tau)_{uv} &= -\tau_u + \tau_v = -\sum_w \rho_w \sigma_{wu} + \sum_w \rho_w \sigma_{wv} \\ &= \sum_w \rho_w \sigma_{uw} = \sigma_{uv}. \end{aligned}$$

See the Remark below.

In general, sheaves that admit partitions of unity [more precisely, for any  $\mathcal{U} = \bigcup U_\alpha$ , maps  $\eta_\alpha: \mathcal{F}(U_\alpha) \rightarrow \mathcal{F}(\mathcal{U})$  s.t. the support of  $(\eta_\alpha \sigma)$