$\operatorname{Ker} T$. Then, using the orthonormal basis $\{f_1, \dots, f_n\}$ of E and the elements $\{h_{k+1}, \dots, h_n\} \in (\operatorname{Ker} T)^{\perp}$ as in Example A.2, we see that

$$\widetilde{\mu}_T = \bigwedge_{i=1}^{k}(e_i,0,0) \wedge \bigwedge_{l=k+1}^{n} (e_l, Te_l, 0) \wedge \bigwedge_{j=1}^{n}(0,0,e_j)$$
$$= c \cdot \bigwedge_{i=1}^{k}(e_i,0,0) \wedge \bigwedge_{r=k+1}^{n} (h_r, f_r, 0) \wedge \bigwedge_{s=1}^{n}(0,0,f_s)\,,$$

where

$$c = \det(\langle Te_l, f_r\rangle_{l,r=k+1}^n) \cdot \det(\langle e_j, f_s\rangle_{j,s=1}^n)\,.$$

In particular, $k=0$ in the above formula whenever T is invertible, so that the expression then simplifies to $c = \det(T)$.

To recapitulate the above, we have shown that there is a natural trivialization of $\mathcal{D}et(\mathcal{T})$ determined by the canonical generator of $\mathcal{D}et(\mathcal{T}_0)$, which when evaluated at an invertible map $T \in L(E,E)$ corresponds to the element

$$\mu_T = \det(T)\, 1 \otimes 1 \in \mathcal{D}et(\mathcal{T}_T)\,. \tag{A.8}$$

This explains the name determinant line bundle for the bundle $\mathcal{D}et(\mathcal{T})$ and concludes our discussion of Example A.7.

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