The natural brackets on couples of vector fields and 1-forms

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Let $\mathcal{M}f_m$ be the category of m-dimensional C^∞ manifolds and their embeddings. If $m \geq 2$, we classify all bilinear $\mathcal{M}f_m$-natural operators $A\colon (T \oplus T^*) \times (T \oplus T^*) \rightsquigarrow (T \oplus T^*)$ transforming $X^i \oplus \omega^i \in \mathcal{X}(M) \oplus \Omega^1(M) (i = 1, 2)$ for m-manifolds M into $A(X^1 \oplus \omega^1, X^2 \oplus \omega^2) \in \mathcal{X}(M) \oplus \Omega^1(M)$. Next, if $m \geq 2$, we find all bilinear $\mathcal{M}f_m$-natural brackets on $\mathcal{X}(M) \oplus \Omega^1(M)$ satisfying the Leibniz rule, and we find all $\mathcal{M}f_m$-natural Lie algebra brackets on $\mathcal{X}(M) \oplus \Omega^1(M)$.