On the Continuity of Exterior Differentiation Between Sobolev-Slobodeckij Spaces of Sections of Tensor Bundles on Compact Manifolds

Abstract:
Suppose $\Omega$ is a nonempty open set with Lipschitz continuous boundary in $\mathbb{R}^n$. There are certain exponents $e \in \mathbb{R}$ and $q \in (1, \infty)$ for which $\frac{\partial}{\partial x^j} : W^{e,q}(\Omega) \to W^{e-1,q}(\Omega)$ is NOT a well-defined continuous operator. Now suppose $M$ is a compact smooth manifold. In this talk we will try to discuss the following questions:

1. How are Sobolev spaces of sections of vector bundles on $M$ defined?

2. Is it possible to extend $d : C^\infty(M) \to C^\infty(T^*M)$ to a continuous linear map from $W^{e,q}(M)$ to $W^{e-1,q}(T^*M)$ for all $e \in \mathbb{R}$ and $q \in (1, \infty)$?

3. Why are we interested in the above question?

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