

Abstract:

The symplectic Dirac and the symplectic twistor operators are symplectic analogues of classical Dirac and twistor operators appearing in spin-Riemannian geometry. Our work concerns basic aspects of these two operators. Namely, we determine the solution space of the symplectic twistor operator on the symplectic vector space of dimension $2n$. It turns out that the solution space is a symplectic counterpart of the orthogonal situation. Moreover, we demonstrate on the example of $2n$ -dimensional tori the effect of dependence of the solution spaces of the symplectic Dirac and the symplectic twistor operators on the choice of the metaplectic structure. We construct a symplectic generalization of classical theta functions for the symplectic Dirac operator as well. We study several basic aspects of the symplectic version of Clifford analysis associated to the symplectic Dirac operator. Focusing mostly on the symplectic vector space of the real dimension 2, this amounts to the study of first order symmetry operators of the symplectic Dirac operator, symplectic Clifford-Fourier transform and the reproducing kernel for the symplectic Fischer product including the construction of bases for the symplectic monogenics of the symplectic Dirac operator in real dimension 2 and their extension to symplectic spaces of higher dimension, respectively.