

Pre-Conference lectures

Clifford analysis: a function theory for the Dirac operator in Euclidean space

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Abstract

Clifford algebras are much suited for factorizing basic second order linear partial differential operators such as the Laplacian, the d'Alembertian,...

In this series of talks, basic concepts will be given concerning the theory of monogenic functions in an open domain Ω of Euclidean space R^{m+1} ($m \geq 1$), i.e. functions $f : \Omega \rightarrow R_{0,m+1}$ which satisfy $\partial_x f = 0$ in Ω . Hereby ∂_x is the Dirac operator in R^{m+1} and $R_{0,m+1}$ is the real universal Clifford algebra constructed over the real quadratic vector space $R^{0,m+1}$. Topics from the following list of subjects will be dealt with:

PART I: Algebraic and geometric tools

- (1.) Real Clifford algebras
- (2.) Subgroups of $R_{0,m+1}$
- (3.) Möbiustransformations in R^{m+1}
- (4.) Complex Clifford algebras and Spinor spaces

PART II: Clifford algebras in analysis

- (1.) Dirac and Weyl operators
- (2.) Basic integral formulae
- (3.) The Cauchy-Kowalewska extension theorem
- (4.) Monogenicity and Möbius transforms

PART III: Spherical Monogenics

- (1.) Homogeneous monogenic polynomials
- (2.) Fisher decompositions
- (3.) Spherical harmonics versus spherical monogenics

PART IV: Clifford algebras in harmonic analysis

- (1.) The Cauchy transform
- (2.) The case S^m
- (3.) The case R^m