Green's Formulas and Poisson's Equation for Bosonic Laplacians

Chao Ding[1] and John Ryan[2]

[1]Masaryk University
[2]University of Arkansas Fayetteville

June 5, 2020

Abstract

A bosonic Laplacian is a conformally invariant second order differential operator acting on smooth functions defined on domains in Euclidean space and taking values in higher order irreducible representations of the special orthogonal group. In this paper, we firstly introduce the motivation for study of the generalized Maxwell operators and bosonic Laplacians (also known as the higher spin Laplace operators). Then, with the help of connections between Rarita-Schwinger type operators and bosonic Laplacians, we solve Poisson's equation for bosonic Laplacians. A representation formula for bounded solutions to Poisson's equation in Euclidean space is also provided. In the end, we provide Green's formulas for bosonic Laplacians in scalar-valued and Clifford-valued cases, respectively. These formulas reveal that bosonic Laplacians are self-adjoint with respect to a given L^2 inner product on certain compact supported function spaces.

Hosted file

DR-Green's Formulas and Poisson's Equation for Bosonic Laplacians.pdf available at https://authorea.com/users/330468/articles/457208-green-s-formulas-and-poisson-s-equation-for-bosonic-laplacians