The symplectic Laplacian

A.Balan

February 16, 2019

Abstract

We construct a Laplacian depending only of a symplectic form and a connection.

1 A 2-form of a connection

We consider the 2-form depending only of a (symplectic) connection over the tangent bundle and with values in the differential operators of 1 order:

$$\Lambda(X,Y)Z = X\nabla_Y Z - Y\nabla_X Z - \nabla_{[X,Y]}Z$$

2 The symplectic Laplacian

We suppose that we have a symplectic form ω, then the symplectic Laplacian is:

$$\Delta_\omega = \omega.\Lambda =$$
$$\sum_i e_i\nabla_{f_i} - f_i\nabla_{e_i} - \nabla_{[e_i,f_i]}$$

with (e_i, f_i) a symplectic basis.

3 Bibliography

A.Cannas da Silva,"Lectures on Symplectic Geometry", Springer, Berlin, 2004.
S.Gallot, D.Hulin, J.Lafontine, "Riemannian Geometry", Springer, Berlin, 2004.
J.Jost, "Riemannian Geometry and Geometric Analysis", Springer, Berlin, 2008.