

# LOCAL AND GLOBAL PROBLEMS IN COMPLEX GEOMETRY

## ABSTRACT

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This thesis is dedicated to globalization of some local structures on foliated affine complex manifolds, to find the cohomology and Chern type invariants on complex Finsler bundles and to study the Laplace type operators and their applications in obtaining of some vanishing theorems of Bochner type on complex Finsler manifolds. The thesis is structured on 4 chapters, as follows.

The aim of chapter 1, entitled *Fundamental notions on complex Finsler bundles* is to present the main results from the geometry of complex Finsler bundles concerning to: complex nonlinear connection, partial connections of Bott type, Chern-Finsler linear connection, metric structures of Sasaki type on the total space and some results about the geometry of the projective bundle associated. This basic notions will be used in the thesis.

In chapter 2, entitled *Foliated complex manifolds of Finsler type*, using the Cèch cohomology, we find cohomological obstructions to globalization of the complex Liouville vector field, the complex nonlinear connection, the complex affine semispray, the complex local Lagrange and Hamilton structures defined on foliated affine complex manifolds.

In chapter 3, entitled *Cohomology and Chern type classes on complex Finsler bundles*, we study the  $v$ -cohomology groups, the vertical and horizontal Chern type classes of a complex Finsler bundle. Also, by integrating over fibers of the projective bundle we obtain the Chern and Segre forms from the first Chern form of tautological line bundle.

In chapter 4, entitled *Vanishing theorems on complex Finsler bundles* we obtain Weitzenböck type formulas and a Bochner type vanishing theorem for holomorphic sections on complex Finsler bundles. Also, a consistent study is dedicated to vertical and horizontal Laplace operators and their applications in obtaining of some vanishing theorems for horizontal and vertical holomorphic tensor fields with compact support on complex Finsler manifolds.