

Index theorems and geodesic flow for meromorphic connections along foliations

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The study of meromorphic connections on Riemann surfaces is a classical topic, related for instance to the 21st Hilbert problem.

In this talk I shall introduce a novel point of view, with unexpected analytic, geometric and dynamical applications. More precisely, I shall show how to associate to holomorphic maps having a positive-dimensional fixed point set a foliation in Riemann surfaces with meromorphic connections along the leaves, and how to use this structure to prove several index theorems generalizing and extending both the classical holomorphic Lefschetz index theorem and the Camacho-Sad index theorems for foliations. Furthermore, I shall describe how to study with analytical and geometrical techniques the geodesic flow associated to a meromorphic connection, with the aim of describing the asymptotic behavior of the real geodesic defined by the connection. Finally, I shall describe a few applications of these results to the study of the dynamics of germs tangent to the identity, to the study of the flow of homogeneous vector fields, and to the study of meromorphic self-maps of the complex projective space.

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