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FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

Mathematics Department

Schottky principal G-bundles over compact Riemann surfaces

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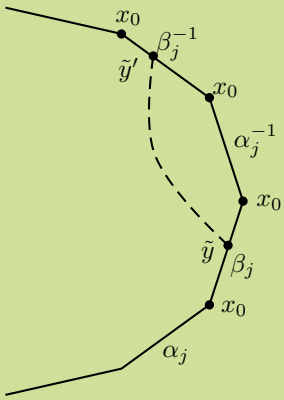
Objectives

We aim at studying a new class of principal G-bundles over compact Riemann surfaces, where G is a Lie group, namely Schottky G-bundles.
A principal G-bundle over a base X is a space E where G acts without fixed points, and whose orbit space is X. We aim to find an algebraic variety which parameterizes the set of equivalence classes of principal G-bundles over a Riemann surface X. This space, when equipped with a suitable geometric structure, is usually called a **moduli space**.



Methodology

1. Using Schottky representations into G, generalise the concept of Schottky vector bundle to Schottky G-bundle. Find some properties of these objects.

2. Study the moduli space of principal G-bundles and its relation with the moduli space of Schottky G-bundles.

3. Describe the map between the tangent spaces of the above objects in orderto prove that, under certain conditions, this map has maximal rank; thus obtaining a local isomorphism of moduli spaces.

$$P_{\mathrm{Ad}_\rho} : H^0\left(X, \mathrm{Ad}E_\rho \otimes \Omega^1_X\right) \to H^1\left(\pi_1(X), \mathfrak{g}_{\mathrm{Ad}_\rho}\right)$$

Expected Results

In the case of Schottky G-bundles, we expect to construct the moduli space and show that this object inherits a Lagrangian structure. These objects arise naturally in classic mechanics, representation theory and quantization.

$$\mathbf{W} := \mathbf{E}_{\mathcal{S}^\sharp} : \quad \mathcal{S}^\sharp \quad \to \quad \mathcal{M}_G^{s,0}$$

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