CLASSICAL MECHANICS ON GRASSMANNIAN AND DISC

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Abstract. In these notes, we will discuss from a purely geometric point of view classical mechanics on certain type of Grassmannians and discs. We will briefly discuss a superversion which in some sense combines these two models, and corresponds to the large-N_c limit of $SU(N_c)$ gauge theory with fermionic and bosonic matter fields, both in the fundamental representation, in $1 + 1$ dimensions [12]. This result is a natural extension of ideas in [16]. There it has been shown that the large-N_c phase space of $1 + 1$ dimensional QCD is given by an infinite dimensional Grassmannian. The complex scalar field version of this theory is worked out in [18] and it is shown that the phase space is an infinite dimensional disc.

1. Introduction

This is a slightly expanded version of the two talks delivered by T. Turgut at Varna Conference on "Geometry, Integrability and Quantization". Since most of the topics presented had a common theme, which is geometry, we present our notes from this point of view. Indeed the field theory model we will eventually discuss has a rich and interesting geometry and indeed this point of view is most natural. In some sense this is another manifestation of the merits of geometric thinking.

First, we start discussing classical mechanics from geometric terms, this is just to provide the setting for what is to come and establish a language. All of this is standard and we refer the reader to the available excellent sources