

CLASSICALLY INTEGRABLE TWO-DIMENSIONAL NON-LINEAR SIGMA MODELS

NOURDDINE MOHAMMEDI

*Laboratoire de Mathématiques et Physique Théorique (CNRS - UMR 6083)
Université François Rabelais de Tours, Faculté des Sciences et Techniques
Parc de Grandmont, F-37200 Tours, France*

Abstract. We give a master equation expressing the zero curvature representation of the equations of motion of a two-dimensional non-linear sigma models. The geometrical properties of this equation are highlighted.

MSC: 81T10, 81T45

Keywords: Duality, equations of motion, nonlinear problems, sigma model, two-dimensional calculations

1. Introduction

This note is a summary and a selection of a longer paper which deals with the issue of integrability in two-dimensional non-linear sigma models [14]. The interest in this subject stems from the fact that, in the past, only few of such theories were known to be integrable. These are the principal chiral model [19], the Wess-Zumino-Witten model and their various modifications. However, recently, more studies have been devoted to this problem and more integrable non-linear sigma models have been discovered [1–4, 7, 10–13, 17, 18]. These theories were found by pure guesses or by brute force. The aim of this short contribution is to provide a systematic method for searching for integrable two-dimensional non-linear sigma models. The result of this work is a ‘master equation’ whose solutions yields all the, so far, known integrable non-linear sigma models.