Acta Math., 165 (1990), 105–159

The convenient setting for real analytic mappings

by

A. KRIEGL and P. W. MICHOR

Universität Wien,
Wien, Austria

Universität Wien,
Wien, Austria

Contents

0. Introduction

We always wanted to know whether the group of real analytic diffeomorphisms of a real analytic manifold is itself a real analytic manifold in some sense. The paper [16] contains the theorem, that this group for a compact real analytic manifold is a smooth Lie group modelled on locally convex vector spaces. (The proof, however, contains a gap, which goes back to Smale in [1]: in canonical charts, no partial mapping of the composition is linear off 0.) The construction there relies on ad hoc descriptions of the topology on the space of real analytic functions. Also the literature dealing with the duals of these spaces like [9] does not really try to describe the topologies on spaces of real analytic functions. There are, however, some older papers on this subject, see [29], [25], [26], [27], [31], [12] and [8].

For some other instances where real analytic mappings in infinite dimensions make their appearance, see the survey article [28].

In this article, we present a careful study of real analytic mappings in infinite (and finite) dimensions combined with a thorough treatment of locally convex topologies on