Introduction to Scale Calculus and M-polyfold theory

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Abstract

The goal of the course is to propagate the recently finished M-polyfold theory of Hofer, Wysocki, and Zehnder [arXiv:1707.08941], world leaders in the field. The new tool, the fruit of almost 20 years of their work, is designed to uniformly deal with moduli spaces arising in the study of non-linear PDEs on manifolds. It comes with a wholly new notion of calculus in infinite dimensions – **scale calculus**.

M-polyfolds are generalizations of manifolds which may have jumping dimension along a component and scale calculus allows to differentiate on such creatures; cf. Figure 1. In finite dimension both, scale calculus and M-polyfolds, reduce to the usual theories, calculus and manifolds.

As the theory is new, almost everything is open. All the traditional notions and constructions, e.g. moduli spaces and their gluing maps, have to be carried over to the new world.

Prerequisites

The target audiance are PhD students, Post-Docs, and researchers.
Calculus and basic notions of Functional Analysis and Differential Geometry:
Linear operators on Banach spaces, manifolds and vector bundles.

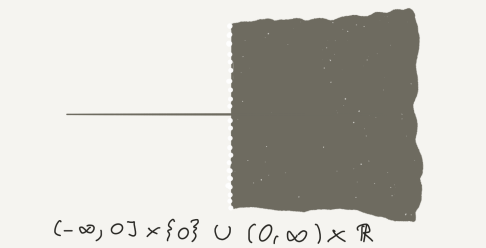
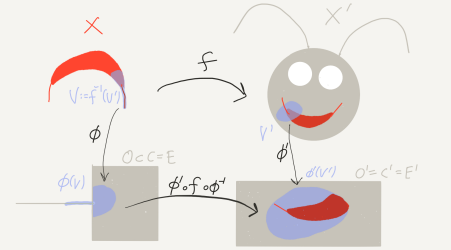


Figure 1: M-polyfold X



Freedom of speech M-polyfold map $f : X \to X'$

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