

ABSTRACT

The object of this work is to develop a theory of differential calculus in the context of complete bornological spaces in such a manner that the theorems which form the base of differential calculus in Banach spaces will generalize to this new setting.

The general approach to this problem is to characterize complete bornological spaces as the inductive limit of its Banach subspaces generated by the family of its bounded, closed, convex, balanced subsets and to work with mappings defined on these spaces which will map a small neighbourhood of zero in any Banach subspace of the domain (bornological) space into a Banach subspace of the range (bornological) space. Then, we make our definitions as in the Banach space case in every Banach subspace of the domain space. In this way, we obtain the usual theorems such as product rule, chain rule, inverse and implicit mapping theorems.

Chapter 1 reviews some results about topological vector spaces and in particular bornological spaces. Chapter 2 is concerned with making the basic definitions of this theory and in establishing the forms of the usual elementary theorems of this calculus. Chapter 3 gives the implicit mapping theorem and an example of the use of some of our results.