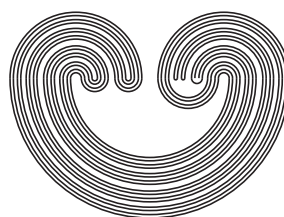


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MAHAVIER LIMITS; THEORY AND APPLICATIONS

by

ITTAY WEISS

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Mail: Topology Proceedings
Department of Mathematics & Statistics
Auburn University, Alabama 36849, USA

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MAHAVIER LIMITS; THEORY AND APPLICATIONS

ITTAY WEISS

ABSTRACT. Generalised inverse limits were introduced in 2006 by Ingram and Mahavier as a generalisation of the classical notion of inverse limit of an inverse system of topological spaces. There followed a rather intensive period of research on the subject with many results established, some of which are direct generalisations of classical results, and others that attest more to the differences between the classical and the generalised notions. It is well-known that inverse limits of spaces are precisely categorical limits in the category of spaces and continuous functions. It is also known that generalised inverse limits are not limits in the category of spaces and upper semicontinuous multivalued functions. In this work we present a categorical extension of the notion of limit in a category to what we call Mahavier limit. We show that the new concept is a generalisation of categorical limit, and that generalised inverse limits of spaces are precisely Mahavier limits in the category of spaces and upper semicontinuous multivalued functions. Foundational categorical tools are extended to the new setting, which are then applied to topological spaces to obtain results regarding a subsequence theorem and mapping theorems.

1. INTRODUCTION

Motivated by an ongoing stream of results directly influenced by work of Mahavier and Ingram that started a decade ago, we develop a generalisation of the notion of categorical limit which extends the link between category theory and inverse limits in topology. We present some fundamental category theoretic results for these new limits, and we employ categorical techniques to obtain results about generalised inverse limits of topological spaces. Why we find the link with category theory important is briefly outlined below, followed by more details on the main results.

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