

Homological dimension, collapsibility and Helly type theorems

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Abstract

In this talk we will discuss the Leray and collapsibility numbers of a simplicial complex K , and their role in Helly type theorems in combinatorial geometry. The Leray number is, roughly speaking, the hereditary homological dimension of K , while the collapsibility number captures the complexity of dismantling K by sequentially removing free faces from K .

Following the formal definition of these parameters and their connection to the combinatorics of convex sets, we will introduce the construction of the “tolerance complex” of a complex K . We will explain its relation to a tolerant version of Helly’s theorem due to Montejano and Oliveros and present some new results on the Leray numbers of these complexes.

The talk is based on joint work with Minki Kim.