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Kolloquium des Mathematischen Instituts

Combinatorial Morse Theory: how and why

Professor Dr. Kai-Uwe Bux (Universität Bielefeld)
25.11.2010, 16:30 Uhr, Hörsaal M 5

Abstract: "The idea of Morse theory is that the topology of a manifold M can be understood with the aid of a sufficiently nice smooth function $h : M \to \mathbf{R}$. We think of h as a height on M and consider sublevel sets $M_r := \{x \in M \mid f(x) \leq r\}$. As the level r increases, the sublevel sets M_r grow; and the goal is to control how the homotopy type of M_r changes during this process.

The goal of combinatorial Morse theory is to understand the homotopy types of a simplicial or CW-complex X by means of a function $h : X \to \mathbf{R}$. Instead of sublevel sets, one considers sublevel complexes, i.e., subcomplexes X_r spanned by all vertices up to height r. Under favorable conditions, one can again control the change how the homotopy type of X_r varies as r increases.

I shall explain and demonstrate the method, giving plenty of examples and applications. The complexes arising will be mostly Eilenberg-MacLane spaces for groups. Hence, understanding their homotopy type yields information about the homology of the underlying group."

Tee wird ab 16:00 Uhr im Sitzungszimmer SR 0 des Mathematischen Instituts serviert.

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