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Chainability and Unidimensionality from a Model-Theoretic Perspective

On the surface, the textbook definitions of chainability and unidimensionality–in the sense of covering dimension–are quite similar. In this talk we use model theory to explore the assertion that this similarity is only skin deep. In the case of dimension, there is a beautiful theorem of E. Hemmingsen that allows us to give a first-order characterization in terms of the language of lattices. We show that no such characterization is possible for chainability by proving that if κ is any infinite cardinal and $\mathcal{B}$ is an open lattice base for a continuum, then $\mathcal{B}$ is elementarily equivalent to an open lattice base for a continuum X, of weight κ, such that X has a three-set open cover admitting no chain open refinement.