LOVÁSZ MEETS ŁOŚ AND TARSKI - UNDERSTANDING FORBIDDEN INDUCED SUBGRAPHS BY MODEL THEORY

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Abstract: The following result is attributed to Lovász.

For every $k \geq 1$, there are graphs $F_1, \ldots, F_{m_k}$ such that a graph G has a vertex cover of size at most k if and only if G has no (induced) subgraph isomorphic to any F_i.

In this talk I will explain a proof of the above result using the Łoś-Tarski Theorem from model theory, and discuss its extensions to other graph properties/classes, e.g., graphs of bounded tree-depth and graphs of bounded shrub-depth.

A simple yet vital step of our logic proof is to go from finite graphs to infinite graphs, without which, we show that the Łoś-Tarski Theorem fails on finite graphs.

This is joint work with Jörg Flum.