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

Yijia Chen
Shanghai Jiaotong University

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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.