

On topological relaxations of chromatic conjectures

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This talk is based on joint work with Gábor Simonyi [1].

László Lovász has introduced a new apparatus for bounding the chromatic number of graphs from below. While the original use for this topological method was to determine the chromatic number of Kneser Graphs, it can be applied to other graphs as well. In fact, we can consider the lower bound this method gives as a new graph parameter on its own right. (There is in fact more than one such parameters, which aren't always equal.)

In this talk, we will use these parameters to search for supporting evidence for certain famous conjectures concerning graph chromatic numbers. We do this by giving an upper bound on this parameter where such a conjecture would give an upper bound on the chromatic number of a graph.

The most notable such evidence is given in [2] for Hadwiger's conjecture. This conjecture states that if a graph has no complete minor with $n + 1$ vertexes, then its chromatic number is at most n . The weaker statement proved states that such a graph has a topological lower bound at most $2n$.

[1] Gábor Simonyi, Ambrus Zsbán, On topological relaxations of chromatic conjectures. Submitted in 2010, preprint: arXiv:1002.4536v1

[2] Gábor Simonyi, Gábor Tardos, Local chromatic number, Ky Fan's theorem, and circular colorings. *Combinatorica*, **26** (2006), 587–626, arXiv:math/0407075v3