Warmth and edge spaces of graphs

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Abstract

In recent years two novel approaches for finding lower bounds on the chromatic number of a graph have been introduced. One involves studying the topological connectivity of the 'edge space' of a graph, dating back to Lovasz's celebrated proof of the Kneser conjecture. The other is motivated by constructions in statistical physics and involves the notion of long range action of random branching walks and the 'warmth' of a graph, as introduced by Brightwell and Winkler.

We seek to relate these two constructions, and in particular we provide evidence for the conjecture that the warmth of a graph G is always less than three plus the connectivity of its edge space. We succeed in establishing the first nontrivial case of the conjecture, and calculate the warmth of a family of graphs with relevant edge space topology. We also demonstrate how the local structure of a graph involving bipartite subgraphs influences warmth, providing an analogue for a similar result in the context of edge spaces. This is joint work with Ragnar Freij.