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Forbidden configurations: Finding the number predicted by the Anstee-Sali conjecture is NP-hard

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Abstract: Let F be a (possibly non-simple) hypergraph and let $\text{forb}(m, F)$ denote the maximum number of edges a simple hypergraph with m vertices can have if it doesn't contain F as a subhypergraph. A conjecture of Anstee and Sali predicts the asymptotic behaviour of $\text{forb}(m, F)$ for fixed F . In this paper we prove that even finding this predicted asymptotic behaviour is an NP-hard problem, meaning that if the Anstee-Sali conjecture were true, finding the asymptotics of $\text{forb}(m, F)$ would be NP-hard.

Keywords: Forbidden configuration, hypergraph, trace, NP-hard, NP-complete, Anstee-Sali conjecture.

Prepovedane konfiguracije: Iskanje števila, napovedanega z Anstee-Sali domnevo, je NP-težko

Povzetek: Naj bo F (ne nujno enostaven) hipergraf in naj $\text{forb}(m, F)$ označuje maksimalno število neusmerjenih povezav, ki jih lahko ima enostaven hipergraf z m vozlišči, če ne vsebuje F kot podhipergraf. Domneva, ki sta jo postavila Anstee in Sali, napoveduje asimptotsko vedenje $\text{forb}(m, F)$ za fiksen F . V tem članku dokažemo, da je celo iskanje tega napovedanega asimptotskega vedenja NP-težek problem. To pomeni: če je Anstee-Sali domneva resnična, potem je iskanje asimptotočnega vedenja $\text{forb}(m, F)$ NP-težko.

Ključne besede: Prepovedana konfiguracija, hipergraf, sled, NP-težek, NP-poln, Anstee-Sali domneva.