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Improving bounds on the diameter of a polyhedron in high dimensions

In 1992, Kalai and Kleitman proved that the diameter of a d -dimensional polyhedron with n facets is at most $n^{\log_2(d)+2}$. Recently, Todd improved the Kalai-Kleitman bound to $(n-d)^{\log_2(d)}$, which is tight for $d \leq 2$, i.e., in low dimensions. We propose a method for tightening Todd's analysis in high dimensions, and prove further improved upper bounds such as $(n-d)^{\log_2(d)-1}$ for $d \geq 7$, $(n-d)^{\log_2(d)-2}$ for $d \geq 37$, and $(n-d)^{\log_2(d)-3+O(1/d)}$ for $d \geq 1$.