
The flag upper bound theorem for 3- and 5-manifolds

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Abstract

We prove that among all flag 3-manifolds on n vertices, the join of two circles with $\lfloor n/2 \rfloor$ and $\lfloor n/2 \rfloor$ vertices respectively is the unique maximizer of the face numbers. This solves the first case of a conjecture due to Lutz and Nevo. Further, we establish a sharp upper bound on the number of edges of flag 5-manifolds and characterize the cases of equality. We also show that the inequality part of the flag upper bound conjecture continues to hold for all flag 3-dimensional Eulerian complexes and characterize the cases of equality in this class.

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