

1048-05-25

Eran Nevo* (en87@cornell.edu), Dep. of Math - Cornell University, Malott Hall, Ithaca, NY 14853-4201. *On the g-conjecture.*

In 1970 McMullen conjectured a complete characterization of the possible f-vectors of boundary complexes of simplicial polytopes. These numerical conditions were proved in 1980, necessity by Stanley and sufficiency by Billera and Lee, known as the g-theorem.

The proof of necessity shows that the hard-Lefschetz property (decomposition) holds for an appropriate ring associated with the polytope. A major open problem, known as the g-conjecture, is to extend these numerical and algebraic assertions to the larger family of simplicial sphere, and beyond.

We will indicate recent developments on this conjecture, focusing on the following results:

1. (Joint with Martina Kubitzke.) The (numerical) g-conjecture holds for the barycentric subdivision of homology spheres. This follows from the following algebraic result: An ‘almost hard-Lefschetz’ property holds for the barycentric subdivision of a shellable complex.

2. (Joint with Eric Babson.) If a homology sphere and one of its face links admit the hard-Lefschetz property, then its stellar subdivision at this face admits the hard-Lefschetz property, and hence satisfies the (numerical) g-conjecture. One ingredient in the proof is showing that the hard-Lefschetz property is preserved under the join operation. (Received December 08, 2008)