NONFORMAL MOMENT-ANGLE MANIFOLDS OF 2-TRUNCATED CUBES

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A space X is rationally formal if its Sullivan-de Rham algebra (A, d) of PL forms with coefficients in $\mathbb{Q}$ is formal in CDGA, i.e., there exists a chain of quasi-isomorphisms between (A, d) and its cohomology algebra $(H^*(A), 0)$. Examples of such spaces include spheres, H-spaces, symmetric spaces, compact connected Lie groups and their classifying spaces, compact Kähler manifolds (Deligne, Griffiths, Morgan, Sullivan). Moreover, formality is preserved by wedges, direct products and connected sums for manifolds. It is well known that a nontrivial higher order Massey operation in cohomology is an obstruction to formality of a topological space. Based on the works of Buchstaber and Panov (see [2]) describing algebraic and topological properties of moment-angle manifolds and complexes, Baskakov [1] found a class of triangulated spheres K s.t. their moment-angle manifolds $\mathcal{Z}_K$ are not formal, having a nontrivial triple Massey product of 3-dimensional cohomology classes. Denham and Suciu [3] proved a combinatorial criterion for a simplicial complex K to provide the situation as above.

We shall introduce a family of n-dimensional flag nestohedra P starting with a simple 3-polytope dual to the Baskakov 2-sphere, s.t. there is a nontrivial n-fold Massey product in cohomology of the moment-angle manifold $\mathcal{Z}_P$ for any $n \geq 3$, see [4]. By Buchstaber and Volodin theorem any flag nestohedron can be realized as a 2-truncated cube (a consecutive cut of only codimension 2 faces starting with a cube); we shall present our family of flag nestohedra as 2-truncated n-cubes for $n \geq 3$.

References

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