ON HOMOLOGY RING OF THE BASED LOOP SPACE ON SOME HOMOGENEOUS SPACES

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Abstract. The techniques of the rational homotopy theory theoretically solved the problem of description of the rational Pontryagin homology ring of the based loop space on a simply connected topological space. It is by Milnor-Moore theorem isomorphic to the universal enveloping algebra of the homotopy Lie algebra for the Sullivan minimal model of the space. The application is far from being direct because of the difficulties with the explicit description of the minimal model.

We consider compact homogeneous spaces and show that this approach can be successfully applied to the numerous examples for the description of the rational homology ring of their based loop space. These include complete flag manifolds of simple compact Lie groups as well as the wider class of generalized symmetric spaces. Moreover, using the results on rational homology ring structure we are able, in the most cases, to resolve integral extension issues and to provide explicit formulas for their integral Pontryagin homology rings.

All together this should provide the base for the description of their free loop space homology rings given by Chas-Sullivan product.