SAMELSON PRODUCTS IN QUASI-p–REGULAR EXCEPTIONAL LIE GROUPS

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For maps $\alpha\colon A \to X, \beta\colon B \to X$ into a homotopy associative H-space with inverse X, the composite

$$A \wedge B \xrightarrow{\alpha\wedge\beta} X \wedge X \xrightarrow{[\cdot,\cdot]} X$$

is called the Samelson product of α, β and is denoted by $\langle\alpha, \beta\rangle$. Here the last arrow is the reduced commutator map.

On the other hand, for a compact connected simple Lie group G, if G has no p–torsion in the integral homology, then there is a p–local homotopy equivalence

$$G \simeq_{(p)} B_1 \times \cdots \times B_{p-1}$$

where B_i is resolvable by spheres of dimension $2i-1 \mod 2(p-1)$. If all B_i are exactly spheres, then G is called p–regular. Furthermore, if each B_i is a sphere or a sphere-bundle over a sphere, then G is called quasi-p–regular.

In studying the multiplicative structure of G, the Samelson products of the factor space inclusions of the above decomposition are fundamental. We completely determined the (non-) triviality of these Samelson products if G is a quasi-p–regular exceptional Lie group in [2].

In this talk we first review how to determine (non-)triviality in the p–regular cases from [1], and consider the quasi-p–regular cases after that. The (non-)triviality is completely determined by using $\mathcal{P}^1$ in the regular cases, but it is not sufficient for the quasi-regular cases. We will use a kind of secondary operations defined by using fundamental representations.

References

[1] S. Hasui, D. Kishimoto, and A. Ohsita, *Samelson products in p-regular exceptional Lie groups*, Topology Appl. **178** (2014), no. 1, 17-29.

[2] S. Hasui, D. Kishimoto, T. Miyauchi and A. Ohsita, Samelson products in quasi-p-regular exceptional Lie groups, arXiv:1703.06658.

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