SAMELSON PRODUCTS IN QUASI-$p$-REGULAR EXCEPTIONAL LIE GROUPS

SHO HASUI

This is a joint work with Daisuke Kishimoto (Kyoto University), Toshiyuki Miyauchi (Fukuoka University), and Akihiro Ohsita (Osaka University of Economics).

For maps $\alpha: A \rightarrow X, \beta: B \rightarrow X$ 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 $\alpha, \beta$ 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 $P^1$ 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.

Faculty of Liberal Arts and Sciences, Osaka Prefecture University, Osaka, 599-8531, Japan
E-mail address: s.hasui@las.osakafu-u.ac.jp