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Twisted Tensor Products Related to the Cohomology of the Classifying Spaces of Loop Groups

Let G be a compact, simply connected, simple Lie group. We show that each twisted tensor product associated with the cohomology of G, in the sense of Brown, constructed by Kono, Mimura, Sambe and Shimada can possess a differential graded algebra structure in the sense of Hess. We thus obtain an economical injective resolution to compute, as an algebra, the cotorsion product which is the E_2-term of the cobar type Eilenberg-Moore spectral sequence converging to the cohomology of classifying space of the loop group LG. As an application, the cohomology $H^*(BLSpin(10); \mathbb{Z}/2)$ is explicitly determined as an $H^*(BSpin(10); \mathbb{Z}/2)$-module with the aid of the Hochschild spectral sequence and the TV-model for $BSpin(10)$.