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Cohomology of $BO(n_1)\times\cdots\times BO(n_m)$ ***with local integer coefficients***

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Abstract: Let $\mathcal{Z}$ be a set of all possible nonequivalent systems of local integer coefficients over the classifying space $BO(n_1) \times ... \times BO(n_m)$. We introduce a cohomology ring $\bigoplus_{\mathcal{G}\in\mathcal{Z}} H^*(BO(n_1) \times ... \times BO(n_m); \mathcal{G})$, which has a structure of a $\mathbb{Z} \oplus (\mathbb{Z}_2)^m$-graded ring, and describe it in terms of generators and relations. The cohomology ring with integer coefficients is contained as its subring. This result generalizes both the description of the cohomology with the nontrivial system of local integer coefficients of $BO(n)$ in [Č] and the description of the cohomology with integer coefficients of $BO(n_1) \times ... \times BO(n_m)$ in [M].

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