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A MULTIPLICATIVE GLUING FORMULA FOR REIDEMEISTER-FRANZ TORSION OF HIGH DIMENSIONAL CLOSED MANIFOLDS

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ABSTRACT

Let M be a $2n$ -dimensional ($n \geq 2$), closed, oriented, smooth manifold which is obtained by a connected sum of two closed, oriented, smooth manifolds M_1 and M_2 . Milnor shows that Reidemeister-Franz torsion acts multiplicatively with respect to such gluings. Namely, the torsion of M is the product of the torsions of M_1 , M_2 , and the torsion of $(2n-1)$ -sphere S^{2n-1} times a corrective term $T(H^*)$ coming from homologies. In this work, by using homological algebra techniques, we obtain a multiplicative gluing formula for the Reidemeister-Franz torsion of M with untwisted \mathbb{R} -coefficients so that the corrective term $T(H^*)$ becomes 1. Moreover, considering a connected sum decomposition for any $2n$ -dimensional, closed, oriented, smooth manifold W , we develop a useful formula, without a corrective term, to compute the Reidemeister-Franz torsion of W with untwisted \mathbb{R} -coefficients in terms of the Reidemeister-Franz torsions of its building blocks in the decomposition.

Keywords: Reidemeister-Franz torsion, connected sum, orientable closed manifolds.