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Corrigendum to "Topological complexity of real Grassmannians"

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There is a problem with the proofs of [1], Lemma 4.4 and the related Theorems 4.5, 4.8 and 4.12 regarding the computation of zero-divisor cup-length of real Grassmann manifolds $G_k(\mathbb{R}^n)$. The correct statements and improved estimates of the topological complexity of $G_k(\mathbb{R}^n)$ will appear in a separate paper by M. Radovanović [2].

Keywords: topological complexity; Grassmann manifold; zero divisor cup-length

AMS classification: 55M30; 55S40

In a recent article [1] we described new estimates of Farber's topological complexity of real Grassmann manifolds $G_k(\mathbb{R}^n)$. In particular, in [1, Theorems 4.5, 4.8, 4.12] we computed the zero-divisor cup-lengths $\mathrm{zcl}(G_2(\mathbb{R}^n))$, $\mathrm{zcl}(G_3(\mathbb{R}^n))$ and $\mathrm{zcl}(G_4(\mathbb{R}^n))$ together with the corresponding lower bounds for topological complexity. This was achieved by finding new non-trivial products in the cohomology of Grassmannians, similar in spirit to those used by Stong [3] to estimate Lusternik-Schnirelmann category of Grassmannians, but chosen in a way that is better suited for the computation of topological complexity. Soon after the publication, we were informed by Prof. M. Radovanović that by using similar methods one can find non-trivial products in the cohomology of Grassmannians that in most cases yield even longer non-trivial products of zero-divisors. As a consequence, the values of zero-divisor cup-lengths stated in the previously mentioned theorems are incorrect, and the resulting lower bounds for topological complexity of real Grassmannians are further improved by the new estimates. For instance, the estimate $\mathrm{zcl}(G_2(\mathbb{R}^{2^s+1})) \geqslant 2^{s+1}-1$ in [1, Theorem 4.5] is improved by Radovanović to $\mathrm{zcl}(G_2(\mathbb{R}^{2^s+1})) \geqslant 2^{s+1}+2^s-4$, and the estimate $\mathrm{zcl}(G_3(\mathbb{R}^{2^s+1})) \geqslant 3\cdot 2^s-2$ in [1, Theorem 4.8] is improved to $\mathrm{zcl}(G_2(\mathbb{R}^{2^s+1})) \geqslant 3\cdot 2^s+2^{s-2}-7$. The precise formulations include several cases and sub-cases and will be presented in detail in a forthcoming paper by M. Radovanović [2]. We are grateful to Prof. Radovanović who discovered the error and provided corrected and improved estimates.

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References

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