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Corrigendum to "On differential Characteristic Classes"

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CORRIGENDUM TO "ON DIFFERENTIAL CHARACTERISTIC CLASSES" J. AUST. MATH. SOC., 99 (2015), NO. 1, 30-47

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Abstract

In this erratum we correct a mistake in "On differential characteristic classes" by the author.

1. Corrigendum

A typo in line -3 of [2, p.34]. $\Omega_{\mathbb{Z}}^{2k-1}(M)$ must be replaced by $\Omega_A^{2k-1}(M)$.

A mistake in [2, Proposition 3.1]: it does not hold in the stated generality.[1] In fact, [2, Proposition 3.1] only holds for Lie groups G with finitely many components with the additional assumption that $H^{\mathrm{even}}(BG)$ is torsion free. In particular, [2, Proposition 3.1] holds for $\mathrm{GL}(n; \mathbb{C})$ and $\mathrm{U}(n)$; i.e., for differential characteristic classes for complex (Hermitian) vector bundles, while it does not hold for $\mathrm{O}(n)$, etc. The differential Steifel–Whitney classes [3] is a counterexample.

Of course [2, Proposition 3.1] would hold in the stated generality if the condition $\delta_2(S_{P,u}(E, \theta)) = u$ is added, as guaranteed by [1, Theorem 2.2]. But the point of the proof of [2, Proposition 3.1] is to avoid using universal bundles and universal connections. The proof of the general case and the analog of [2, Proposition 3.1] for some other Lie groups will be addressed in a future paper.

References

[1]We would like to thank Thomas Schick for bringing up this point.

[1] Jeff Cheeger and James Simons, 'Differential characters and geometric invariants', in: *Geometry and topology (College Park, Md., 1983/84)*, *Lecture Notes in Math.* **1167** (Springer, Berlin, 1985) pp. 50–80.

[2] Man-Ho Ho, 'On differential characteristic classes', *J. Aust. Math. Soc.* (1) **99** (2015), 30–47.

[3] John W. Zweck, 'The Stiefel-Whitney spark', *Houston J. Math.* (2) **27** (2001), 325–351.

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