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ERRATUM: TWO HYPERBOLIC SCHWARZ LEMMAS

L. BERNAL-GONZÁLEZ AND M.C. CALDERÓN-MORENO

In [**1**] there is an error, as pointed out to us by J.M. Isidro. In that paper we consider the set $\mathcal{R}_m$ of all m-rotations, that is, $\mathcal{R}_m = \{cz^m : \ |c| = 1\}$; the set $\mathrm{Aut}(\mathbb{D})$ of the automorphisms of the unit disc $\mathbb{D}$ and the set of the m-automorphisms of $\mathbb{D}$, $\mathrm{Aut}_m(\mathbb{D}) = \{\psi \circ R \circ \varphi : \ \psi, \varphi \in \mathrm{Aut}(\mathbb{D}), \ R \in \mathcal{R}_m\}$. We asserted that

$$\{f \in \mathrm{Aut}_m(\mathbb{D}) : \ f(a) = b\} = \{\varphi_b \circ R \circ \varphi_a : \ R \in \mathcal{R}_m\}, \tag{1}$$

where $\varphi_a(z) = (a-z)/(1-\overline{a}z)$. Equality (1) is not true. For instance, it suffices to consider $f(z) = \varphi_{1/4} \circ z^2 \circ \varphi_{1/2}$. We have that $f \in \mathrm{Aut}_2(\mathbb{D})$, $f(0) = 0$ and, after calculations, $f(z) = (7z^2 - 6z)/(6z - 7)$. Then it is evident that will never hold $f(z) = \varphi_0 \circ R \circ \varphi_0$ with $R \in \mathcal{R}_2$, because φ_0 is equal to identity.

However it is easy to check that the first set in (1) contains the second one. This lets us save Lemma 2.1 [**1**] as follows.

LEMMA 2.1. *Assume that $m \in \mathbb{N}$, $a \in \mathbb{D}$, $f \in H(\mathbb{D})$, $|f| < 1$ on $\mathbb{D}$ and $\mu(f,a) \geqslant m$. Then we have*

$$\left|\frac{f(z) - f(a)}{1 - \overline{f(a)}f(z)}\right| \leqslant \left|\frac{z - a}{1 - \overline{a}z}\right|^m \qquad (z \in \mathbb{D}) \tag{2}$$

and $\left|f^{[m]}(a)\right| \leqslant m!$.

Further, if either equality holds in (2) *for some* $z \neq a$ *or* $\left|f^{[m]}(a)\right| = m!$ *then* $f \in \mathrm{Aut}_m(\mathbb{D})$.

With this new auxiliary result all the other statements in [**1**] can be established with the same proofs.

REFERENCES

[**1**] L. Bernal-González and M.C. Calderón-Moreno, 'Two hyperbolic Schwarz lemmas', *Bull. Austral. Math. Soc.* **66** (2002), 17–24.

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Departamento de Análisis Matemático
Facultad de Matemáticas, Apdo. 1160
Avenida Reina Mercedes
41080 Sevilla
Spain
e-mail: lbernal@us.es
mccm@us.es