1. Introduction. In recent years considerable attention has been given to disjointness preserving operators on Banach lattices (see e.g. [1], [5], [15] or [17]), on spaces of continuous functions (see e.g. [2], [10], [12], [14] or [16]) and on group algebras of locally compact Abelian groups ([11]). Three major directions of investigation have been followed in the above papers, namely the automatic continuity of disjointness preserving operators, their multiplicative representation and their spectral theory.

In [9], the automatic continuity results for disjointness preserving mappings between group algebras in [11] were extended to the class of regular Banach function algebras (see Section 2). Let us recall that a linear map $T$ defined from a regular Banach function algebra $A$ into such an algebra $B$ is said to be disjointness preserving or separating if $f \cdot g \equiv 0$ implies $T(f) \cdot T(g) \equiv 0$ for all $f, g \in A$. In this paper we focus on the behaviour of disjointness preserving mappings defined between Fourier algebras on locally compact amenable (not necessarily Abelian) groups. These algebras and their Fourier–Stieltjes algebras were introduced by P. Eymard in his fundamental article [7]. For a locally compact group $G$, $B(G)$ denotes its Fourier–Stieltjes algebra, that is, the linear span of all continuous positive definite functions on $G$. Regarded as the dual of the universal $C^*$-algebra, $C^*(G)$, the algebra $B(G)$ is a Banach space with norm $\| \cdot \|$ (the dual norm of $C^*(G)$) and even a commutative semisimple Banach algebra under pointwise multiplication. $A(G)$ will denote the Fourier algebra of $G$, which is the closed subalgebra of $B(G)$ generated by functions with compact support. It is well known (see [7]) that $A(G)$ is a regular semisimple commutative Banach algebra. Indeed, $A(G)$ is a closed ideal in $B(G)$ and its structure space is $G$. Furthermore, $A(G)$ satisfies Ditkin’s condition ([7, 4.11]), i.e., it is a Ditkin algebra.

If $G$ is allowed to be Abelian and $\hat{G}$ denotes its dual group, then $B(G)$ consists of the Fourier–Stieltjes transforms of $M(\hat{G})$, the regular complex...
Borel measures on $\hat{G}$. Similarly, $A(G)$ is nothing but the Fourier transforms of the elements of the group algebra $L^1(G)$.

In Section 3, we shall prove that the Fourier algebras of two locally compact amenable groups, $G_1$ and $G_2$, are (algebra) isomorphic if and only if there exists a disjointness preserving bijection between them. Such disjointness preserving bijection of $A(G_1)$ onto $A(G_2)$ can be extended, in a unique way, to a weighted composition map between the Fourier–Stieltjes algebras of $G_1$ and $G_2$. These results extend the ones in [11] given for $L^1(G)$ and $M(G)$, where $G$ is a locally compact Abelian group. As corollaries, we show that if there exists either a supremum norm isometry or a bipositive bijection which preserves cozero sets between two Fourier algebras, then they are (algebra) isomorphic.

2. Preliminaries and background. Throughout, $\mathbb{N}$ (resp. $\mathbb{R}$, $\mathbb{C}$) stands for the set of all natural numbers (resp. real, complex numbers). If $X$ is locally compact, then $X \cup \{\infty\}$ denotes its Aleksandrov compactification. As usual, $C_0(X)$ denotes the Banach algebra of all complex-valued continuous functions on $X$ which are zero at infinity provided with the supremum norm $\|\cdot\|_{\infty}$. If $f \in C(X)$ (the linear space of all complex-valued continuous functions on $X$), the cozero set of $f$ is the set $\text{coz}(f) := \{x \in X : f(x) \neq 0\}$ and $\text{supp}(f)$ denotes the support of $f$, i.e., the closure of $\text{coz}(f)$. When $U$ is any subset of $X$, we denote by $\text{int}(U)$ the interior of $U$ and by $\text{cl}(U)$ the closure of $U$ in $X$. For any $f \in C(X)$, $f|_{U}$ stands for the restriction of $f$ to $U$.

Let $A$ be a commutative Banach algebra which may or may not have an identity element. Let $\Phi_A$ be the (locally compact) structure space of $A$. The Gelfand transform of $f \in A$ is denoted by $\hat{f}$. We write $\hat{A}$ for the point-separating subalgebra of $C_0(\Phi_A)$ consisting of all $\hat{f}, f \in A$.

Next we gather the main results concerning disjointness preserving maps between regular Banach function algebras, which can be found in [9]:

In the sequel, let $A$ and $B$ be regular semisimple commutative Banach algebras, which is to say, regular Banach function algebras. Associated with a disjointness preserving map $T : A \to B$, we can define a linear mapping $\hat{T} : \hat{A} \to \hat{B}$ as $\hat{T}(\hat{f}) := \hat{T}(f)$ for every $f \in A$. Since $A$ and $B$ are semisimple, it is easy to check that $T$ is disjointness preserving if and only if $\hat{T}$ is disjointness preserving. In like manner, $T$ is injective (resp. surjective) if and only if $\hat{T}$ is injective (resp. surjective).

If $\gamma \in \Phi_B$, let $\delta_\gamma \circ \hat{T} : \hat{A} \to \mathbb{C}$ be the functional defined as $(\delta_\gamma \circ \hat{T})(\hat{f}) := \hat{T}(\hat{f})(\gamma)$ for all $f \in A$.

In general, a disjointness preserving map $T : A \to B$ induces a continuous mapping $h$ of $\Phi_B$ into $\Phi_A \cup \{\infty\}$, which may make no sense if $A$ and $B$ are
not regular. We call \( h \) the support map of \( T \). If \( T \) is continuous, then it is a weighted composition map; i.e., \((\delta \circ \hat{T})(\hat{f}) = \hat{T}(\hat{f})(\gamma) = \kappa(\gamma)\hat{f}(h(\gamma))\) for all \( \gamma \in \Phi_B \) and all \( f \in A \), where the weight function \( \kappa : \Phi_B \to \mathbb{C} \) is continuous, and the range of \( h \) is contained in \( \Phi_A \). If, in addition, \( T \) is surjective, then the point-separating property of \( \hat{B} \) easily implies that \( \kappa \) is nonvanishing on \( \Phi_B \).

**Proposition 1** [9, Proposition 3]. Let \( U \) be an open subset of \( \Phi_A \cup \{\infty\} \) and suppose that \( f \in A \). Then:

1. \( \hat{f}|_{U \cap \Phi_A} \equiv 0 \) implies that \( \hat{T}(\hat{f})|_{h^{-1}(U)} \equiv 0 \).
2. \( h(\text{coz}(\hat{T}(\hat{f}))) \subset \text{cl}_{\Phi_A \cup \{\infty\}}(\text{coz}(\hat{f})) \).
3. If \( T \) is injective, then \( h(\Phi_B) \) is a dense subset of \( \Phi_A \cup \{\infty\} \).

The main result in [9] is the following:

**Theorem 1.** Let \( T : A \to B \) be a disjointness preserving bijection. If \( A \) satisfies Ditkin’s condition (i.e., if \( A \) is a Ditkin algebra), then:

1. \( T \) is continuous.
2. \( T^{-1} \) is disjointness preserving.
3. If also \( B \) satisfies Ditkin’s condition, then \( h \), the support map of \( T \), is a homeomorphism of \( \Phi_A \) onto \( \Phi_B \).

As a consequence of this theorem and the above paragraphs, if there exists a disjointness preserving bijection \( T \) of \( A \) onto \( B \), then \( \hat{T}(\hat{f})(\gamma) = \kappa(\gamma)\hat{f}(h(\gamma)) \) for all \( f \in A \) and all \( \gamma \in \Phi_B \). Since \( T^{-1} \) is also disjointness preserving and, consequently, continuous, we can write \( \hat{T}^{-1}(\hat{g})(\zeta) = \Psi(\zeta)\hat{g}(h^{-1}(\zeta)) \) for all \( g \in B \) and all \( \zeta \in \Phi_A \), where \( h^{-1} \) can be proved to be the inverse of the homeomorphism \( h \). We will call \( \kappa \in C(\Phi_B) \) and \( \Psi \in C(\Phi_A) \) the weight functions associated with \( T \).

3. Characterizations of (algebra) isomorphisms between Fourier algebras by means of disjointness preserving mappings. Let \( A \) be a semisimple commutative Banach algebra. A multiplier \( T \) on \( A \) is a bounded linear operator on \( A \) into itself which satisfies \( T(f \cdot g) = f \cdot T(g) = T(f) \cdot g \) for all \( f,g \in A \). We use \( M(A) \) to denote the commutative Banach algebra consisting of all multipliers on \( A \). By [18, Corollary 1.2.1], we may identify \( M(A) \) with the normed algebra of all bounded continuous functions \( \phi \) on \( \Phi_A \) such that \( \phi , \hat{A} \subset \hat{A} \). It is then apparent that multipliers are examples of disjointness preserving mappings.

**Theorem 2.** Let \( A \) and \( B \) regular semisimple commutative Banach algebras. Then \( A \) and \( B \) are (algebra) isomorphic if and only if there exists a continuous disjointness preserving bijection between them whose (associated) weight functions are multipliers.
Proof. Let us suppose that there exists a continuous disjointness preserving bijection \( T \) of \( A \) onto \( B \). First we claim that \( \hat{g} \circ h^{-1} \in \hat{A} \) for all \( g \in B \). To prove this, let \( \zeta \in \Phi_A \) and \( f \in A \) such that \( \hat{f}(\zeta) = 1 \). Hence

\[
1 = \hat{f}(\zeta) = \hat{T}^{-1}(\hat{T}(\hat{f}))(\zeta) = \Psi(\zeta) \cdot \hat{T}(\hat{f})(h^{-1}(\zeta)) = \Psi(\zeta) \cdot \kappa(h^{-1}(\zeta)) \cdot \hat{f}(h(h^{-1}(\zeta))) = \Psi(\zeta) \cdot \kappa(h^{-1}(\zeta));
\]

that is, \( \Psi(\zeta) \cdot \kappa(h^{-1}(\zeta)) = 1 \) for all \( \zeta \in \Phi_A \). On the other hand, from the fact that \( \hat{B} \) is an ideal in \( M(B) \) (see [18]) and since, by hypothesis, \( \kappa : \Phi_B \to \mathbb{C} \) belongs to \( M(B) \), we infer that \( \kappa \cdot \kappa \cdot (\hat{f} \circ h) \) belongs to \( \hat{B} \) for every \( f \in A \). Consequently,

\[
\hat{T}^{-1}(\kappa \cdot \kappa \cdot (\hat{f} \circ h))(\zeta) = \Psi(\zeta) \cdot \kappa(h^{-1}(\zeta)) \cdot \kappa(h^{-1}(\zeta)) \cdot \hat{f}(h(h^{-1}(\zeta)))
\]

for all \( \zeta \in \Phi_A \). This implies that the function \( (\kappa \circ h^{-1}) \cdot \hat{f} \) belongs to \( \hat{A} \) for all \( f \in A \), which is to say that \( \kappa \circ h^{-1} \) belongs to \( M(A) \). Hence, since \( \hat{A} \) is an ideal in \( M(A) \) and the function \( \Psi \cdot (\hat{g} \circ h^{-1}) \) belongs to \( \hat{A} \), we see that \( (\kappa \circ h^{-1}) \cdot \Psi \cdot (\hat{g} \circ h^{-1}) = (\hat{g} \circ h^{-1}) \) belongs to \( \hat{A} \) for all \( g \in B \).

In like manner, we can prove that \( f \circ h \) belongs to \( \hat{B} \) for all \( f \in A \). Hence, it is now clear, since \( h : \Phi_B \to \Phi_A \) is a homeomorphism, that the mapping \( \hat{T}_h : \hat{A} \to \hat{B} \), defined as \( \hat{T}_h(\hat{f}) := \hat{f} \circ h \), is a surjective algebra isomorphism, which, by semisimplicity, provides the desired algebra isomorphism of \( A \) onto \( B \).

The converse is clear.

Theorem 3. Let \( A \) and \( B \) be Ditkin algebras. Then \( A \) and \( B \) are (algebra) isomorphic if and only if there exists a disjointness preserving bijection between them whose weight functions are multipliers.

Proof. Combine Theorems 1 and 2.

We now turn our attention to Fourier algebras. Let us first recall that a locally compact group \( G \) is said to be amenable if it has a bounded approximate identity or, equivalently, if there exists a left-invariant mean on \( L^\infty(G) \) (see, e.g., [6]).

Let \( \Sigma \) be the set of all unitary continuous representations of \( G \). For \( \sigma \in \Sigma \) and an arbitrary bounded Radon measure \( \mu \), we denote by \( \| \sigma(\mu) \| \) the norm of \( \int \sigma(x) d\mu(x) \), and \( \| \mu \|_\Sigma := \sup \{ \| \sigma(\mu) \| : \sigma \in \Sigma \} \). For \( \gamma \in G \), \( \delta_\gamma \) denotes the Dirac measure concentrated at \( \gamma \).

Lemma 1. Let \( G_1 \) and \( G_2 \) be locally compact groups. Assume further that \( G_1 \) is amenable. Let \( T : A(G_1) \to A(G_2) \) be a disjointness preserving bijection. Then the weight function \( \kappa \) belongs to \( B(G_2) \).
Proof. Let \( \{\gamma_1, \ldots, \gamma_n\} \) be a subset of \( G_2 \) and \( \varepsilon > 0 \). By [6, Theorem 7], there exists \( f \in A(G_1) \) such that \( \|f\| < 1 + \varepsilon \) and \( f(h(\gamma_i)) = 1 \) for \( i = 1, \ldots, n \).

Let \( \{c_1, \ldots, c_n\} \subseteq \mathbb{C} \). Then, since \( T \) is continuous, we have
\[
\left| \sum_{i=1}^{n} c_i \cdot \kappa(\gamma_i) \right| = \left| \sum_{i=1}^{n} c_i \cdot T(f)(\gamma_i) \right| \\
\leq \|T(f)\| \left| \sum_{i=1}^{n} c_i \delta_{\gamma_i} \right| \leq \|T\|(1 + \varepsilon) \left| \sum_{i=1}^{n} c_i \delta_{\gamma_i} \right|.
\]

Consequently,
\[
\left| \sum_{i=1}^{n} c_i \cdot \kappa(\gamma_i) \right| \leq \|T\| \left| \sum_{i=1}^{n} c_i \delta_{\gamma_i} \right|.
\]

From the continuity of \( \kappa \) and from the Bochner–Schoenberg–Eberlein-type characterization of the elements of \( B(G_2) \) in [7, Corollary 2.24], we infer that \( \kappa \in B(G_2) \). □

Remark 1. If the amenability of \( G_1 \) is dropped, then Lemma 1 may fail to be true. Namely, in [8], the authors provide a locally compact group \( G \) and a function \( \phi \) on \( G \) such that \( \phi f \in A(G) \) for every \( f \in A(G) \), while \( \phi \notin B(G) \).

Theorem 4. Let \( G_1 \) and \( G_2 \) be locally compact amenable groups. Then \( A(G_1) \) and \( A(G_2) \) are algebra isomorphic if and only if there exists a disjointness preserving bijection between them.

Proof. Since \( A(G_2) \) is an ideal in \( B(G_2) \) ([7, 3.4]), it is clear that \( B(G_2) \subseteq M(A(G_2)) \). Hence the result follows from Lemma 1 and Theorem 3. □

Corollary 1. Let \( G_1 \) and \( G_2 \) be locally compact amenable groups. Then \( A(G_1) \) and \( A(G_2) \) are algebra isomorphic if they are \( \|\cdot\|_\infty \)-isometric; i.e., there exists a linear bijection \( T \) of \( A(G_1) \) onto \( A(G_2) \) such that \( \|f\|_\infty = \|T(f)\|_\infty \) for all \( f \in A(G_1) \).

Proof. Let \( \tau(A(G_i)) \) \( (i = 1, 2) \) stand for the set of all strong boundary points for \( A(G_i) \). Recall that \( \gamma \in G_i \) is a strong boundary point for \( A(G_i) \) if for every open neighbourhood \( U \) of \( \gamma \), there exists \( f \in A(G_i) \) with \( \|f\|_\infty = |f(\gamma)| \) and \( |f|_{G_i \setminus U} < \|f\|_\infty \). Define the following subset of \( G_2 \):
\[
G^0_2 := \bigcup_{\zeta \in \tau(A(G_1))} \{\gamma \in G_2 : |f(\zeta)| = |T(f)(\gamma)| \text{ for all } f \in A(G_1)\}.
\]
Since \( A(G_i) \) is a regular subalgebra of \( C_0(G_i) \) (see Section 2), [3, Corollary 4.3] entails that the set \( G^0_2 \) coincides with \( \tau(A(G_2)) \).
On the other hand, by the Bishop–de Leeuw Theorem (see, e.g., [13, Corollary 12.10]) the set $\tau(A(G_1))$ is dense in the Shilov boundary of $A(G_1)$. Furthermore, it is well known that the Shilov boundary of $A(G_i)$ coincides with $G_i$ since $A(G_i)$ is regular. As a consequence, we deduce that $G_1^0$ is dense in $G_2$.

The remainder of the proof consists in checking that $T$ is disjointness preserving and applying Theorem 4. Assume, contrary to what we claim, that there are $f, g \in A(G_1)$ with disjoint cozero sets such that $T(f) \cdot T(g) \neq 0$. In virtue of the density of $G_2^0$, we can choose $\gamma_0 \in G_2^0$ such that $|T(f)(\gamma_0)| > 0$ and $|T(g)(\gamma_0)| > 0$. By the definition of $G_2^0$, there exists $\zeta_0 \in \tau(A(G_1))$ such that $|f(\zeta_0)| = |T(f)(\gamma_0)|$ for all $f \in A(G_1)$. Since the cozero sets of $f$ and $g$ are disjoint, we see that either $f(\zeta_0)$ or $g(\zeta_0)$ is zero, which yields that either $T(f)(\gamma_0) = 0$ or $T(g)(\gamma_0) = 0$. This contradiction proves that $T$ is disjointness preserving.

**Remark 2.** As a straightforward consequence of Corollary 1 and the main results (Theorem 3 and its corollary) of [19], we infer that two locally compact amenable groups, $G_1$ and $G_2$, are topologically isomorphic if and only if $A(G_1)$ and $A(G_2)$ are $\| \cdot \|$-isometric and $\| \cdot \|_\infty$-isometric.

**Definition 1.** Let $T : \mathcal{X} \to \mathcal{Y}$ be a map defined between spaces of functions. It is said that $T$ preserves cozero sets if $\text{coz}(f) \subseteq \text{coz}(g)$ yields $\text{coz}(T(f)) \subseteq \text{coz}(T(g))$ for any $f, g \in \mathcal{X}$.

In [4], the authors show that Fourier algebras are ordered vector spaces for two order relations, namely the pointwise and the positive definite ordering. Among other results, they prove ([4, Proposition 4.2]) that continuous linear bipositive (pointwise) bijections between Fourier algebras are weighted composition maps. The following result shows that preserving cozero sets is a sufficient condition for such bipositive bijections to be automatically continuous. Indeed, they are disjointness preserving, which yields that $A(G_1)$ and $A(G_2)$ are (algebra) isomorphic.

**Corollary 2.** Let $G_1$ and $G_2$ be locally compact amenable groups. If there exists a linear bipositive (pointwise) bijection $T$ of $A(G_1)$ onto $A(G_2)$ which preserves cozero sets, then $T$ is automatically continuous. Furthermore, in that case, $A(G_1)$ and $A(G_2)$ are (algebra) isomorphic.

**Proof.** We shall check that $T$ is disjointness preserving and thus the results will follow from Theorems 1 and 4. Let $A(G_i)^+ (i = 1, 2)$ denote the positive cone of $A(G_i)$. Let $f, g \in A(G_1)^+$ such that $\text{coz}(T(f)) \cap \text{coz}(T(g)) \neq \emptyset$. By the regularity of $A(G_2)$, one can find a function $0 \neq k \in A(G_2)^+$ such that $k \leq T(f)$ and $k \leq T(g)$. Hence, the positivity of $T(f)$, $T(g)$ and $k$ yields $\text{coz}(k) \subseteq \text{coz}(T(f)) \cap \text{coz}(T(g))$. Since $T^{-1}$ also preserves positive functions,
we have $0 \not= T^{-1}(k) \subseteq \text{coz}(f) \cap \text{coz}(g)$. As a consequence, the restriction of $T$ to $A(G_1)^+$ is disjointness preserving.

Given a function $f \in A(G_i)$, let $\overline{f}$ denote its complex conjugate. By [7, 3.8], we have $f, g \in A(G_1)$. Let $f, g \in A(G_1)$ be such that $\text{coz}(f) \cap \text{coz}(g) = \emptyset$. Hence $\text{coz}(f \cdot \overline{f}) \cap \text{coz}(g \cdot \overline{g}) = \emptyset$. From the above paragraph, we know that $\text{coz}(T(f \cdot \overline{f})) \cap \text{coz}(T(g \cdot \overline{g})) = \emptyset$. Since $T$ preserves cozero sets, we conclude that $\text{coz}(T(f)) \cap \text{coz}(T(g)) = \emptyset.$

In closing, we study the possibility of extending disjointness preserving mappings from Fourier algebras to Fourier–Stieltjes algebras.

**Theorem 5.** Let $G_1$ and $G_2$ be locally compact amenable groups and let $T$ be a disjointness preserving bijection of $A(G_1)$ onto $A(G_2)$. Then $T$ has a unique extension to a weighted composition bijection of $B(G_1)$ onto $B(G_2)$.

**Proof.** From Section 2, we know that $T(f)(\gamma) = \kappa(\gamma)f(h(\gamma))$ for all $\gamma \in G_2$ and all $f \in A(G_1)$. We also know that $h$ is a homeomorphism of $G_1$ onto $G_2$, $\kappa$ does not vanish on $G_2$ and, from Lemma 1, it belongs to $B(G_2)$.

We now claim that $\phi \circ h$ belongs to $B(G_2)$ for all $\phi \in B(G_1)$. Let $\{\gamma_1, \ldots, \gamma_n\}$ be a subset of $G_2$ and let $\varepsilon > 0$. By [6, Theorem 7], there exists $g \in A(G_1)$ such that $\|g\| < 1 + \varepsilon$ and $g(h(\gamma_i)) = 1$ for $i = 1, \ldots, n$. Fix $\phi \in B(G_1)$ and put $\varphi := \phi \cdot g$, which belongs to $A(G_1)$. Let $\{c_1, \ldots, c_n\} \subset \mathbb{C}$. By Theorem 2, we may consider the continuous algebra homomorphism $T_h : A(G_1) \to A(G_2)$ defined to be $T_h(f) := f \circ h$. Then

$$\left| \sum_{i=1}^{n} c_i \cdot \phi(h(\gamma_i)) \right| = \left| \sum_{i=1}^{n} c_i \cdot T_h(\varphi)(\gamma_i) \right| \leq \|T_h(\varphi)\| \left| \sum_{i=1}^{n} c_i \delta_{\gamma_i} \right| \leq \|T_h\|(1 + \varepsilon) \left| \sum_{i=1}^{n} c_i \delta_{\gamma_i} \right| \Sigma.$$

Since $\varepsilon$ is arbitrary, we infer that

$$\left| \sum_{i=1}^{n} c_i \cdot \kappa(\gamma_i) \right| \leq \|T_h\| \left| \sum_{i=1}^{n} c_i \delta_{\gamma_i} \right| \Sigma.$$

From the continuity of $\phi \circ h$ and from [7, Corollary 2.24], we deduce that $\phi \circ h \in B(G_2)$. In like manner, we can prove that $\psi \circ h^{-1} \in B(G_1)$ for all $\psi \in B(G_2)$.

As a consequence of the above paragraph, the mapping $\overline{T} : B(G_1) \to B(G_2)$ defined as $\overline{T}(\varphi)(\gamma) := \kappa(\gamma)\varphi(h(\gamma))$, for all $\varphi \in B(G_1)$ and all $\gamma \in G_2$, is an extension of $T$. From the first paragraph of the proof, it is apparent that $\overline{T}$ is injective.

In order to prove the surjectivity of $\overline{T}$, let $\psi \in B(G_2)$. If $\Psi$ is as in the proof of Theorem 2, then we know that $\Psi$ belongs to $B(G_1)$ and $\kappa(\psi \circ h) = 1$ on $G_2$. Hence, it is a routine matter to verify that $\overline{T}(\psi \cdot (\psi \circ h^{-1})) = \psi.$
Finally, suppose that there is another extension of $T$ to a weighted composition bijection $\tilde{T}$ of $B(G_1)$ onto $B(G_2)$. Assume that $\tilde{T}(\varphi)(\gamma) = \omega(\gamma) \varphi(h'(\gamma))$, for all $\varphi \in B(G_1)$ and all $\gamma \in G_2$. Fix $\gamma_0 \in G_2$ and choose $f \in A(G_1)$ such that $f(h(\gamma_0)) = f(h'(\gamma_0)) = 1$. Since $\tilde{T} = \tilde{T}$ on $A(G_1)$, we infer that $\kappa(\gamma_0) = \omega(\gamma_0)$. Hence, $\kappa \equiv \omega$ on the whole $G_2$ and, consequently, $f(h(\gamma)) = f(h'(\gamma))$ for all $f \in A(G_1)$ and each $\gamma \in G_2$. The regularity of $A(G_1)$ shows that $h \equiv h'$ on $G_2$.

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