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Structure of contractible locally C^*-algebras

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ABSTRACT

A locally C^*-algebra (:inverse limit of C^*-algebras) is contractible iff it is topologically isomorphic to the cartesian product of a family of full matrix algebras. This result answers in positive a conjecture posed by A.Ya. Helemskii in a conversation with the author. The general question concerning the structure of an arbitrary contractible Arens-Michael algebra (:inverse limit of Banach algebras), came out from a relevant result of J.L. Taylor [3; Proposition 5.7] and it is still open, even in the normed case. The problem is solved for commutative Arens-Michael algebras (Taylor-Helemskii [1; Theorem IV. 5.27]) and for semiprime Fréchet Arens-Michael algebras having a nice geometrical property, the so-called approximation property of A. Grothendieck (Selivanov [2; Theorem 5]). Our result can not be taken from the preceding ones, since an arbitrary locally C^*-algebra is neither commutative nor Fréchet; take, for instance, the cartesian product of an uncountable family of full matrix algebras (where at least one of them consists of matrices of size > 1). Notice that such an algebra is always contractible [3; p. 181].

References

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[2] Y.V. Selivanov, *Fréchet algebras of global dimension zero;* Proceedings of the IIIrd International Conference on Algebra, held in Kranoyarsk, Russia, August 23–28, 1993. Walter de Gruyter, 1996, 225–236.

[3] J.L. Taylor, *Homology and cohomology for topological algebras;* Advances in Math. 9 (1972), 137–182.

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