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Moscow spaces, Pestov-Tkačenko Problem, and C-embeddings

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Abstract: We show that there exists an Abelian topological group G such that the operations in G cannot be extended to the Dieudonné completion μG of the space G in such a way that G becomes a topological subgroup of the topological group μG. This provides a complete answer to a question of V.G. Pestov and M.G. Tkačenko, dating back to 1985. We also identify new large classes of topological groups for which such an extension is possible. The technique developed also allows to find many new solutions to the equation $\upsilon X \times \upsilon Y = \upsilon(X \times Y)$. The key role in the approach belongs to the notion of Moscow space which turns out to be very useful in the theory of C-embeddings and interacts especially well with homogeneity.

Keywords: Moscow space, Dieudonné completion, Hewitt-Nachbin completion, C-embedding, G_δ-dense set, topological group, Souslin number, tightness, canonical open set
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