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Topological Function Spaces, Double Ultralimits and Definability

We explore applications of C_p-theory, Grothendieck spaces and countable tightness in Model Theory and Analysis. In particular, we will discuss Gowers' problem, which asks if the Tsirelson space or, more generally, if Banach spaces not including isomorphic copies of l^p or c_0 are definable. Casazza, Dueñez and Iovino's work negatively answers Gowers' problem in first-order (in fact, continuous) logic. However, one could argue that this logic lacks enough expressive power for the analyst's ε-play. We use techniques from C_p-theory and work with conditions concerning the interchangeability of double (ultra)limits in order to generalize the aforementioned undefinability results far beyond first-order logic, for example to infinitary logics such as countable fragments of continuous $L_{\omega_1,\omega}$, which have non-compact spaces associated to them.