On some classes of quasitopological groups.

Summary: In this paper, we mainly consider some cardinal invariants and grasps of quasitopological groups and some properties of two classes of quasitopological groups. We show that: (1) There exists a pseudocompact quasitopological group $K$ with countable cellularity and $\mathfrak{In}(K) > \omega$, which gives a negative answer to [30, Question 5.3] ([27, Question 3.6]); (2) There exists a pseudocompact quasitopological group $G$ of countable cellularity and uncountable $g$-tightness, which gives a negative answer to [8, Open problem 4.6.9]; (3) There exists a Tychonoff quasitopological group $G$ containing compact invariant subgroups $F, M$ such that $G = FM$, but the space $G$ is not Čech-complete, which gives a partial answer to [8, Open problem 4.6.9]; (4) A Fréchet-Urysohn quasitopological group $G$ with sequentially continuous multiplication is a strong $\alpha_4$-space; and as an application, we give a partial answer to [9, Question 2.4]. We also introduce the concept of strong quasitopological groups. Some properties of strong quasitopological groups are obtained, which generalize some properties of topological groups. As some applications, we give some partial answers to related open problems.

MSC:
22A05 Structure of general topological groups
54A25 Cardinality properties (cardinal functions and inequalities, discrete subsets)
54E25 Semimetric spaces
54G20 Counterexamples in general topology
54H11 Topological groups (topological aspects)

Keywords:
quasitopological group; topological group; cardinal invariant; cellularity; $\lambda$-narrow; Fréchet-Urysohn; $G_\delta$-diagonal

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References: