Ling, Xuewei; Lin, Shou; He, Wei
Metrizable and weakly metrizable coset spaces. (English) Zbl 07318671
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Summary: In this paper, we study metrizable and weakly metrizable coset spaces. It is mainly shown that (1) If $H$ is a closed neutral subgroup of a topological group $G$, then $G/H$ is metrizable $\Leftrightarrow$ $G/H$ is bisequential $\Leftrightarrow$ $G/H$ is weakly first-countable $\Leftrightarrow$ $G/H$ is a Fréchet-Urysohn space with an $\omega^\omega$-base; (2) If $H$ is a closed neutral subgroup of a semitopological group $G$, then $G/H$ is metrizable if and only if $G/H$ is a paracompact feathered space with countable $\pi$-character; (3) If $H$ is a closed neutral subgroup of a paratopological group $G$ such that $G/H$ is a Hausdorff space, then $G/H$ is quasi-metrizable if and only if $G/H$ is first-countable; (4) If $H$ is a closed neutral subgroup of a quasitopological group $G$, then $G/H$ is semi-metrizable if and only if $G/H$ is first-countable.

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:
topological group; semitopological group; paratopological group; quasitopological group; coset space; neutral subgroup; metrizable space; quasi-metrizable space; semi-metrizable space

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References: