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# Covering maps for locally path-connected spaces

*Abstract.* We define Peano covering maps and prove basic properties analogous to classical covers. Their domain is always locally path-connected but the range may be an arbitrary topological space. One of characterizations of Peano covering maps is via the uniqueness of homotopy lifting property for all locally path-connected spaces.

Regular Peano covering maps over path-connected spaces are shown to be identical with generalized regular covering maps introduced by Fischer and Zastrow. If $X$ is path-connected, then every Peano covering map is equivalent to the projection $\widetilde{X}/H \to X$, where $H$ is a subgroup of the fundamental group of $X$ and $\widetilde{X}$ equipped with the basic topology. The projection $\widetilde{X}/H \to X$ is a Peano covering map if and only if it has the unique path lifting property. We define a new topology on $\widetilde{X}$ for which one has a characterization of $\widetilde{X}/H \to X$ having the unique path lifting property if $H$ is a normal subgroup of $\pi_1(X)$. Namely, $H$ must be closed in $\pi_1(X)$. Such groups include $\pi(\mathcal{U}, x_0)$ ($\mathcal{U}$ being an open cover of $X$) and the kernel of the natural homomorphism from the fundamental group to the Cech fundamental group.