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On Topological Complexity of Nonorientable Surfaces

The topological complexity $TC(X)$ of a space X was defined by M. Farber as a numerical invariant which measures the navigational complexity of X considered as a configuartion space of a mechanical system. $TC(X)$ can be defined as the minimal k such that $X \times X$ can be covered by k open set each of which deformable into the diagonal ΔX. We recall that the LS-category $catY$ of Y is the minimal number k such that Y can be covered by k open sets each of which can be deformable into a point. Thus the equality $TC(X) = cat((X \times X)/\Delta X)$ seems to be natural for reasonable X. We show that this equality does not hold true for nonorientable surfaces X of genus ¿ 1.