## Planar absolute retracts and countable structures

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A compact space is said to be an absolute retract (AR) if it is homeomorphic to a retract of the Hilbert cube. In particular, every AR is a locally connected, simply connected continuum. The following lemma shows an interesting property of ARs in the plane.

**Lemma.** If  $X, Y \subseteq \mathbb{R}^2$  are absolute retracts, then X is homeomorphic to Y if and only if  $\partial X$  is homeomorphic to  $\partial Y$ .

A sketch of the proof of this lemma is going to be shown, as well as examples witnessing the importance of the assumption that X and Y are ARs.

This lemma has a nice consequence belonging to the field of invariant descriptive set theory (a discipline studying complexities of equivalence relations on standard Borel spaces).

**Theorem.** The homeomorphism equivalence relation on the class of planar absolute retracts is classifiable by countable structures.

On the other hand, we also have the following theorem.

**Theorem.** The homeomorphism equivalence relation on the class of absolute retracts contained in  $\mathbb{R}^3$  is not classifiable by countable structures.

**Question.** Is the homeomorphism equivalence relation on the class of planar absolute neighborhood retracts classifiable by countable structures?

