

# WEAK AND STRONG LIMITS OF SOBOLEV HOMEOMORPHISMS

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ABSTRACT. As is well known, in any Banach space weakly closed convex sets and closed convex sets are the same. However, for non-convex sets the strategies for accomplishing the relations between weak and strong closures are only partially understood. The set of all weak limits of sequences in a subset of a Banach space need not be weakly closed. Because of that the Direct Method (Hilbert-Zaremba-Tonelli) for studying energy-minimal Sobolev homeomorphisms (hyper-elastic deformations) runs into a serious difficulty. Let  $\mathbb{X}$  and  $\mathbb{Y}$  be bounded Lipschitz domains in  $\mathbb{R}^2$ . We (Jani Onninen and T.I) prove that the weak and strong limits of Sobolev homeomorphisms  $h: \mathbb{X} \xrightarrow{\text{onto}} \mathbb{Y}$  are equal. The utility of this result will be illustrated by establishing the existence of  $2D$ -traction free energy-minimal deformations.

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