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by

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NORMALITY CONDITIONS OF STRUCTURES IN COARSE GEOMETRY AND AN ALTERNATIVE DESCRIPTION OF COARSE PROXIMITIES

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Abstract. We introduce an alternative description of coarse proximities. We define a coarse normality condition for connected coarse spaces and show that this definition agrees with large scale normality defined in [6] and asymptotic normality defined in [10]. We utilize the alternative definition of coarse proximities to show that a connected coarse space naturally induces a coarse proximity if and only if the connected coarse space is coarsely normal. We conclude with showing that every connected asymptotic resemblance space induces a coarse proximity if and only if the connected asymptotic resemblance space is asymptotically normal.

1. Introduction

Coarse topology (i.e., large-scale geometry) studies large-scale properties of spaces (e.g., asymptotic dimension, property A, exactness). It emerged as a counterpart to classical topology, which is usually concerned with small-scale properties of spaces (e.g., continuity, compactness). Tools and techniques developed by coarse topologists are often useful in other branches of mathematics, including geometric group theory (see [8]), index theory (see [12]), and dimension theory (see [9]). Coarse topology is also closely related to well-known conjectures, including the Novikov conjecture (see [14]) and the coarse Baum-Connes conjecture (see [3] or [1]).

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Key words and phrases. Coarse geometry, coarse topology, coarse proximity, proximity, large scale normality, coarse normality, alternative definition of coarse proximities, coarse spaces, asymptotic resemblance spaces.