SOME REMARKS ABOUT METRIC SPACES, SPHERICAL MAPPINGS, FUNCTIONS AND THEIR DERIVATIVES

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Abstract

If $p \in \mathbb{R}^n$, then we have the radial projection map from $\mathbb{R}^n \setminus \{p\}$ onto a sphere. Sometimes one can construct similar mappings on metric spaces even when the space is nontrivially different from Euclidean space, so that the existence of such a mapping becomes a sign of approximately Euclidean geometry. The existence of such spherical mappings can be used to derive estimates for the values of a function in terms of its gradient, which can then be used to derive Sobolev inequalities, etc. In this paper we shall discuss these topics mostly in the context of metric doubling measures, which provides a nontrivial setting in which these mappings exist and can be used. This provides an alternative approach (or understanding) of the results in [DS], and a variation on the themes of [Se4].

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