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Products of free spaces and applications

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Resumo

In recent years, much attention has been dedicated to the so-called *free spaces* over a metric space. These Banach spaces are natural isometric preduals to spaces of Lipschitz functions and encode important geometric properties of the original metric space, in particular concerning optimal transport. Despite of their simple definition, many basic questions on free spaces remain unanswered. In this exposition, we show that the free space over a Banach space X, denoted by $\mathcal{F}(X)$, is isomorphic to the ℓ_1-sum of countable copies of $\mathcal{F}(X)$. As applications, we deduce a non-linear version of Pełczyński's decomposition method for free spaces and identify the free space over any n-dimensional compact riemannian manifold with $\mathcal{F}(\mathbb{R}^n)$, up to isomorphism.