LEAVES OF LAMINATIONS AND COLORINGS OF GRAPHS

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Abstract. Consider triples (M, f, x), where M is an n-dimensional manifold, $x \in M$ and $f \in C^\infty(M, \mathfrak{H})$, where $\mathfrak{H}$ a separable Hilbert space. Two triples (M, f, x) and (N, g, y) are declared to be equivalent if there is an pointed isometry $\phi\colon (M, x) \to (N, y)$ such that $f = \phi^* g$. The set of equivalent classes of these triples can be endowed with a Polish topology such that certain subspaces are canonically foliated. Using these foliated structure, it is shown that any Riemannian manifold M of bounded geometry can be isometrically realized as a leaf of a compact Riemannian foliated space X with trivial holonomy groups. Moreover X can be chosen to be minimal if M is repetitive. The reciprocal statements are elementary. To get the trivial holonomy groups of X and its minimality, an appropriate C^∞ function $f : M \to \mathfrak{H}$ must be chosen. The properties of bounded geometry allow to discretize this problem, reducing it to the following result about graph colorings. For any graph with an upper bound of its vertex degrees, it is proved that there is a limit-aperiodic vertex coloring by finitely many colors. Moreover the coloring can be chosen to be repetitive if the graph is repetitive.

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2010 *Mathematics Subject Classification.* 05C15.

Key words and phrases. graph, coloring, limit aperiodic, repetitive.