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Generalized Patterson-Sullivan measures for products of Hadamard spaces

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Let Γ be a discrete group acting by isometries on a product $X = X_1 \times X_2$ of Hadamard spaces. We further require that X_1, X_2 are locally compact and Γ contains two elements projecting to a pair of independent rank one isometries in each factor. Apart from discrete groups acting by isometries on a product of CAT(-1)-spaces, the probably most interesting examples of such groups are Kac-Moody groups over finite fields acting on the Davis complex of their associated twin building. In a previous article we showed that the regular geometric limit set Lim splits as a product $F_\Gamma \times P_\Gamma$, where $F_\Gamma \subseteq \text{rand}_1 \times \text{rand}_2$ is the projection of the geometric limit set to $\text{rand}_1 \times \text{rand}_2$, and P_Γ encodes the ratios of the speed of divergence of orbit points in each factor. Our aim in this paper is a description of the limit set from a measure theoretical point of view. We first study the conformal density obtained from the classical Patterson-Sullivan construction, then generalize this construction to obtain measures supported in each Γ -invariant subset of the regular limit set and investigate their properties. Finally we show that the Hausdorff dimension of the radial limit set in each Γ -invariant subset of Lim is bounded above by the exponential growth rate introduced in the previous article.

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