

Inhomogeneous multiplicative Diophantine approximation on matrix approximation

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Abstract. In this paper, we establish a coherent theory for inhomogeneous multiplicative Diophantine approximation on matrix approximation. More specifically, for any $n, m \in \mathbb{N}$ and $\mathbf{y} \in [0, 1]^n$, let $\psi : \mathbb{N} \rightarrow [0, \infty)$ be a positive non-increasing function, and $\alpha_1, \alpha_2, \dots, \alpha_n$ be positive reals with $A(n) = \alpha_1 + \dots + \alpha_n$. A dichotomy law of the Hausdorff measure for the following set

$$\mathcal{M}_{n,m}^{\mathbf{y}}(\psi; \alpha_1, \dots, \alpha_n) := \left\{ \mathbf{x} \in [0, 1]^{nm} : \prod_{i=1}^n \|q_1 x_{i1} + \dots + q_m x_{im} - y_i\|^{\alpha_i} < \psi(|\mathbf{q}|)^{A(n)} \text{ for i.m. } \mathbf{q} \in \mathbb{Z}^m \right\}$$

is obtained, which depends on the convergence or divergence of a certain series.

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Mathematics Subject Classification: 11J83, 11K55.

Key words and phrases: multiplicative Diophantine approximation, Hausdorff measure.