Lyapunov Exponents for products of matrices.

Let $M = (M_1, \cdots, M_k)$ be a tuple of real $d \times d$ matrices. Under certain irreducibility assumptions, we give checkable criteria for deciding whether $M$ possesses the following property: there exist two constants $\lambda \in \mathbb{R}$ and $C > 0$ such that for any $n \in \mathbb{N}$ and any $i_1, \cdots, i_n \in \{1, \cdots, k\}$, either $M_{i_1} \cdots M_{i_n} = 0$ or $C^{-1} e^{\lambda n} \leq \|M_{i_1} \cdots M_{i_n}\| \leq C e^{\lambda n}$, where $\|\cdot\|$ is a matrix norm. The proof is based on symbolic dynamics and the thermodynamic formalism for matrix products. As applications, we are able to check the absolute continuity of a class of overlapping self-similar measures on $\mathbb{R}$, the absolute continuity of certain self-affine measures in $\mathbb{R}^d$ and the dimensional regularity of a class of sofic affine-invariant sets in the plane. (Received September 04, 2017)