Denote by $T$ an irrational rotation by $\alpha$ on the additive circle $X = [0,1)$, that is $Tx = x + \alpha \mod 1$. Let $f: X \to \mathbb{R}^+$ be an $L^1$ function. Let $T^f = (T_t^f)_{t \in \mathbb{R}}$ stand for the corresponding special flow acting on the space $X^f = \{(x,t) : x \in [0,1), 0 \leq t < f(x)\}$, i.e. the action of $\mathbb{R}$ under which a point $(x,t) \in X^f$ moves vertically with the unit speed and we identify $(x,f(x))$ with $(Tx,0)$. Such a flow preserves a finite measure $\tilde{\mu}$ equal to the restriction of the product of Lebesgue measure $\mu$ on $X$ and Lebesgue measure on $\mathbb{R}$. We assume that $\alpha$ satisfies the following condition: There exists $\theta > 0$ such that

\[(*) \quad q_{n+1} = O(q_n^{1+\theta}), \quad q_n^{1+\theta} = O(q_{n+1}),\]

where $(q_n)$ denotes the sequence of denominators of $\alpha$. Given $0 < \kappa < 1$, let $C^\kappa_+ (X)$ denote the set of all positive, Hölder continuous with Hölder exponent $\kappa$, real functions defined on $X$. The main result of the paper states the following:

Given $\theta$ and $\kappa$ (and $\alpha$ satisfying $(*)$) as above there exist $\beta = \beta(\theta, \kappa) > 0$ and $f \in C^\kappa_+ (X)$ such that for some $t^* \in \mathbb{R}$ and $M > 0$,

$$|\tilde{\mu}(T_t^f(Q_1) \cap Q_2) - \tilde{\mu}(Q_1)\tilde{\mu}(Q_2)| < Mt^{-\beta}$$

for arbitrary rectangles $Q_1, Q_2 \subset X^f$ and $t > t^*$.

It follows that the special flow $T^f$ is mixing (at a polynomial rate on rectangles). A function $f$ that appears in the above theorem is of the form $f = \lim f_n$, where $f_n(x) = 1 + \sum_{k=1}^n u_k(x)$, $u_k(x) = \frac{a_k}{q_k}u_0(q_kx)$ and $u_0(x) = \min(x,1-x) - \frac{1}{4}$ for $x \in X$ (with some combinatorial conditions put on the sequence $(a_n)$).


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