Let $(M, \mu)$ be a Lebesgue space, $T$ an automorphism, and $f(n)$ a sequence of positive reals tending to zero. $T$ is said to allow approximation by periodic transformations with speed $f(n)$ if there is a sequence of finite partitions $\zeta_n = \{C_n^k\}$ $(1 \leq k \leq q_n)$, $\zeta_n \to \varepsilon$ (the trivial partition), and periodic automorphisms $S_n$ of $(M, \mu)$ of period $q_n$, with $S_n\zeta_n = \zeta_n$, such that $\sum_{k=1}^{q_n} \mu(TC_n^k \Delta S_nC_n^k) < f(q_n)$. The first paper is concerned with speed $o(f(q_n))$. If $f(q_n) = 1/\ln q_n$, then $T$ is ergodic but not mixing, $U_{Tq_n} \to E$ strongly, and the maximal spectral type of $U_T$ is singular. These considerations are applied to the construction of ergodic automorphisms and flows. One such construction is as follows. Let $(M, \mu)$ be the circle with Lebesgue measure. Let $M' = M \times \mathbb{Z}_2$, $T'(x, j) = (x + \alpha, n(x)j)$, where $\alpha$ is irrational, $n(x) = -1$ on $[0, \gamma)$ and $n(x) = 1$ on $(\gamma, 1]$. If $\alpha$ and $\gamma$ satisfy certain conditions related to approximation by rationals, and $H_{-1}$ is the subspace of $L^2(M')$ defined by $f(x, 1) = -f(x, -1)$, then $U_{T'}$ has continuous spectrum on $H_{-1}$. If $\sigma$ is the maximal spectral type of $U_{T'}$, then $\sigma \perp \sigma^* \sigma$.

In the second paper, it is shown that any automorphism may be approximated with speed $a_n/\ln n$, where $a_1 \leq a_2 \leq \cdots$ and $a_n \to \infty$. If $c(T) = \inf \{c: T$ allows approximation with speed $c/\ln n\}$, then, if $T$ is ergodic, $h(T) \leq c(T) \leq 2h(T)$. If $T$ is ergodic, it can be approximated with speed $o(1/\ln n)$ if and only if $h(T) = 0$.

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