ERRATUM

Gytis Kulaitis pointed out some typos in the statement of Theorem 15 of [1]. The proof seems correct.

Recall we consider a $\mathbb{R}^d$-valued Markov chain $(X_n)_{n \geq 1}$ with transition kernel $P$ and initial distribution $\nu \in \mathcal{P}(\mathbb{R}^d)$ and we set $\mu_N := N^{-1} \sum_1^N \delta_{X_n}$. We assume that it admits a unique invariant probability measure $\pi$ and the following $L^2$-decay property (usually related to a Poincaré inequality)

\begin{equation}
\forall n \geq 1, \forall f \in L^2(\pi), \quad \|P^n f - \pi(f)\|_{L^2(\pi)} \leq \rho_n \|f - \pi(f)\|_{L^2(\pi)}
\end{equation}

for some sequence $\rho = (\rho_n)_{n \geq 1}$ decreasing to 0.

**Theorem 15.** Let $p \geq 1$, $d \geq 1$ and $r > 2$ be fixed. Assume that our Markov chain $(X_n)_{n \geq 0}$ satisfies (1) with a sequence $(\rho_n)_{n \geq 1}$ satisfying $\sum_{n \geq 1} \rho_n < \infty$. Assume also that the initial distribution $\nu$ is absolutely continuous with respect to $\pi$ and satisfies $\|d\nu/d\pi\|_{L^r(\pi)} < \infty$. Assume finally that $M_q(\pi) < \infty$ for some $q > pr/(r-1)$. Setting $q_r := q(r-1)/r$ and $d_r = d(r+1)/r$, there is a constant $C$, depending only on $p,d,r,q,\rho,M_q(\pi)$ and $\|d\nu/d\pi\|_{L^r(\pi)}$ such that for all $N \geq 1$,

\[ E_\nu(T_p(\mu_N,\pi)) \leq C \begin{cases} 
  N^{-1/2} + N^{-(q_r-p)/q_r} & \text{if } p > d_r/2 \text{ and } q_r \neq 2p, \\
  N^{-1/2} \log(1+N) + N^{-(q_r-p)/q_r} & \text{if } p = d_r/2 \text{ and } q_r \neq 2p, \\
  N^{-p/d_r} + N^{-(q_r-p)/q_r} & \text{if } p \in (0,d_r/2) \text{ and } q_r \neq d_r/(d_r-p).
\end{cases} \]

**References**