Note: This errata listing is not included in the published version of this paper. The proof of Proposition 4.15 given in the published version of this paper is incorrect. Below is a corrected proof.

**Proposition 4.15.**
Assume the coefficients \( \{c_0, \ldots, c_N\} \) satisfy \( \sum c_k = 2 \) and \( n + 1 \) sum rules. If 
\[
\hat{\rho}(T_0|V^n, T_1|V^n) < 2^{-l}
\]
for some \( 0 \leq l \leq n \), then an \( l \)-times continuously differentiable, compactly supported scaling function exists, and its \( l \)-th derivative is Hölder continuous for each exponent
\[
0 \leq \alpha < \min \{1, -\log_2(2^{l} \hat{\rho}(T_0|V^n, T_1|V^n))\}.
\]

**Proof.** Recall from Lemma 4.14 that \( \{e_0, \ldots, e_j\} \) is a basis for \( U^j \) for each \( j = 0, \ldots, n \). By Gram-Schmidt, we can find orthonormal vectors \( u_0, \ldots, u_n \) so that \( \{u_0, \ldots, u_j\} \) is a basis for \( U^j \) for each \( j \). Note that \( \dim(V^n) = N - n - 1 \); let \( \{v_{n+1}, \ldots, v_{N-1}\} \) be an orthonormal basis for \( V^n \). Then since each \( V^j \) is the orthogonal complement of \( U^j \) in \( C^N \), we have that \( \{u_{j+1}, \ldots, u_n, v_{n+1}, \ldots, v_{N-1}\} \) is an orthonormal basis for \( V^j \). Since each \( U^j \) is left-invariant under both \( T_0, T_1 \), we can write the matrices \( T_0, T_1 \) in the basis \( \{u_0, \ldots, u_n, v_{n+1}, \ldots, v_{N-1}\} \) as
\[
BT_iB^{-1} = \begin{pmatrix}
1 & 0 \\
2^{-1} & \ddots \\
& \ddots & 2^{-n} \\
& & * & C_i
\end{pmatrix}, \quad i = 0, 1,
\]
for an appropriate change-of-basis matrix \( B \). Because \( V^j \) is the orthogonal complement of \( U^j \), and because \( \{u_0, \ldots, u_n, v_{n+1}, \ldots, v_{N-1}\} \) is an orthonormal basis for \( C^N \), it is the case that the lower right submatrix
\[
\begin{pmatrix}
2^{-j-1} & 0 \\
& \ddots & \ddots \\
& & 2^{-n} \\
& & & * & C_i
\end{pmatrix}
\]
of \( BT_iB^{-1} \) is the matrix for \( T_i|V^j \) in the basis \( \{u_{j+1}, \ldots, u_n, v_{n+1}, \ldots, v_{N-1}\} \).

Therefore, by Lemma 4.7,
\[
\hat{\rho}(T_0|V^j, T_1|V^j) = \begin{cases}
\max \{2^{-j-1}, \ldots, 2^{-n}, \hat{\rho}(C_0, C_1)\}, & j = 0, \ldots, n - 1, \\
\hat{\rho}(C_0, C_1), & j = n.
\end{cases}
\]
Thus,
\[ \hat{\rho}(T_0|_{V_{1}}, T_1|_{V_{1}}) = \max\{2^{-l-1}, \hat{\rho}(T_0|_{V_{n}}, T_1|_{V_{n}})\}, \]
so the hypothesis \( \hat{\rho}(T_0|_{V_{n}}, T_1|_{V_{n}}) < 2^{-l} \) implies \( \hat{\rho}(T_0|_{V_{1}}, T_1|_{V_{1}}) < 2^{-l} \). The result therefore follows from Theorem 4.12. \( \square \)

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