Algorithm 1 Haar Wavelet Multiplication

Require: Matrices A and B

$\hat{A} \leftarrow \psi^n(A)$

$\hat{B} \leftarrow \psi^n(B)$

$\hat{C} \leftarrow \hat{A} \cdot \hat{B}$

$C \leftarrow \psi^{-n}\left(\hat{C}\right)$

Algorithm 2 Sparse Haar Wavelet Multiplication

Require: Matrices A and B

$\hat{A} \leftarrow \psi^n(A)$

$\hat{B} \leftarrow \psi^n(B)$

$l_A \leftarrow \text{sparsify}\left(\hat{A}\right)$

$l_B \leftarrow \text{sparsify}\left(\hat{B}\right)$

$l_C \leftarrow \text{sparse multiply}\ (l_A, l_B)$

$\hat{C} \leftarrow \text{densify}\left(\hat{C}\right)$

$C \leftarrow \psi^{-n}\left(\hat{C}\right)$