On wavelet polynomials and Weyl multipliers

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The talk is based on the following paper, joint with Grigori A. Karagulyan (Faculty of Mathematics and Mechanics, Yerevan State University, Armenia):

- Anna Kamont, Grigori A. Karagulyan, *On wavelet polynomials and Weyl multipliers*, https://arxiv.org/abs/2104.03124 .

Abstract. Let $\Phi = \{\phi_n, n \geq 1\} \subset L^2[0,1]$ be a wavelet type orthonormal system. Then for each p, $1 < p < \infty$, there is $C = C(\Phi, p) > 0$ such that for all $f \in L^p[0,1]$, $n \in \mathbf{N}$ and finite sets of indices $G_m \subset \mathbf{N}$

$$\Big\| \max_{1 \leq m \leq n} |\sum_{j \in G_m} (f, \phi_j)\phi_j| \Big\|_p \leq C\sqrt{\log(n+1)} \|f\|_p.$$

The factor $\sqrt{\log(n+1)}$ is optimal in this setting.

We apply this inequality, with $p = 2$, to discuss Weyl multipliers for a.e. convergence or unconditional a.e. convergence for orthonormal systems consisting of non-overlapping polynomials with respect to Φ.