

$$\begin{aligned}
& \sum_{\ell=4}^{\infty} 2^{\ell s_1 q} \left( \sum_{k=0}^{\ell-4} 2^{-N\tilde{p}\ell} 2^{k\tilde{p}[(1-\rho)(\lfloor 2n/r \rfloor + 1) + m + \rho N]} \left\| \mathcal{M}_r(\tilde{\varphi}_k(D)f) \mathcal{M}_r(\tilde{\Phi}_k(D)g) \right\|_{L^p}^{\tilde{p}} \right)^{\frac{q}{\tilde{p}}} \\
& \lesssim \sum_{k=0}^{\infty} 2^{kq[(1-\rho)(\lfloor 2n/r \rfloor + 1 - N) + m + s_1 + \varepsilon]} \left\| \mathcal{M}_r(\tilde{\varphi}_k(D)f) \mathcal{M}_r(\tilde{\Phi}_k(D)g) \right\|_{L^p}^q. \quad (0.1)
\end{aligned}$$