The L^p-Boundedness of the Dyadic Martingale Square Function

Abstract: In this talk we will establish the following Burkholder-type inequality:

$$C_{p,n}^{-1}\|f\|_{L^p(\mathbb{R}^n)} \leq \left\| \left(\sum_{k\in\mathbb{Z}} |D_k(f)|^2 \right)^{1/2} \right\|_{L^p(\mathbb{R}^n)} \leq C_{p,n}\|f\|_{L^p(\mathbb{R}^n)},$$

for every $f \in L^p(\mathbb{R}^n)$, where $p \in (1,\infty)$ and D_k is the dyadic martingale difference operator at scale $k \in \mathbb{Z}$. The proof relies on the orthogonality of Rademacher functions through the use of Khintchine's inequalities, and will be in large part, self-contained.