Probabilistic Construction of Second Order Riesz Transforms in Compact Lie Groups

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We will obtain martingale transforms that are built in a natural way from Brownian motion in a general Lie group G. Using sharp inequalities due to Burkholder we can then construct a class of linear operators that are bounded on $L^p(G, m)$ (where m is a Haar measure) for all $1 < p < \infty$. When the group is compact, second order Riesz transforms are shown to arise in this way and we use Peter-Weyl theory to exhibit these as Fourier multipliers.

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