

ABSTRACT

The aim of this thesis is to present a study of various maximal functions, starting from the Hardy-Littlewood maximal function on \mathbf{R}^n to more general ones on compact Lie groups. Our main interest here will be the L^p -inequality

$$\|\mathcal{M}f\|_p \leq C_p \|f\|_p, \quad f \in L^p(X),$$

where \mathcal{M} denotes a maximal operator on $L^p(X)$, $1 < p \leq \infty$.

We discuss various approaches to this subject, including covering lemmas, interpolation theorems, the Fourier transform method, the g -function argument, the Mellin transform technique, and Lie group and representation theoretic arguments. We obtain, in particular, some results for maximal functions associated to distributions on \mathbf{R}^n and a generalization of those on compact semisimple Lie groups.