APPLICATIONS OF THE FOURIER TRANSFORM
TO CONVEX GEOMETRY

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ABSTRACT

The thesis is devoted to the study of various problems arising from Convex Geometry

and Geometric Functional Analysis using tools of Fourier Analysis.

In chapters two through four we consider the Busemann-Petty problem and its different modifications and generalizations. We solve the Busemann-Petty problem in hyperbolic and spherical spaces, and the lower dimensional Busemann-Petty problem in the hyperbolic space. In the Euclidean space we modify the assumptions of the original Busemann-Petty problem to guarantee the affirmative answer in all dimensions.

In chapter five we introduce the notion of embedding of a normed space in L_0, investigate the geometry of such spaces and prove results confirming the place of L_0 in the scale of L_p spaces.

Chapter six is concerned with the study L_p-centroid bodies associated to symmetric convex bodies and generalization of some known results of Lutwak and Grinberg, Zhang to the case $-1 < p < 1$.

In chapter seven we discuss Khinchin type inequalities and the slicing problem. We obtain a version of such inequalities for $p > -2$ and as a consequence we prove the slicing problem for the unit balls of spaces that embed in L_p, $p > -2$.