

# On the geometry of complex Grassmann manifold, its noncompact dual and coherent states

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## Abstract

Different topics on the differential geometry of the complex Grassmann manifold are surveyed in relation to the coherent states. A calculation of the tangent conjugate locus and conjugate locus in the complex Grassmann manifold is presented. The proofs use the Jordan's stationary angles. Also various formulas for the distance on the complex Grassmann manifold are furnished.

## 1 Introduction

"Grassmann manifold... has been intensively studied for many years. We have not got a comprehensive knowledge of its geometry, however".[1]

Without entering into historical details, the Grassmann manifold has been intensively studied from the second half of the last century. The real euclidean geometry of linear manifolds in a multidimensional space was considered by Jordan[2] using only the methods of the analytic geometry. In the first half of our century the Grassmann manifold was the main example in many constructions as the CW-cell decomposition,[3] the Chern[4] and Pontrjagin[5] classes... The basic facts about

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