
GIQ **23** (2022) 39–57

SERIES ON
Geometry, Integrability and Quantization
ISSN 1314-3247

OCTONIONIC PLANES AND REAL FORMS OF G_2, F_4 AND E_6

DANIELE CORRADETTI[1], ALESSIO MARRANI[2], DAVID CHESTER[3] and RAYMOND ASCHHEIM[3]

Communicated by Ivaïlo M. Mladenov

In this work we present a useful way to introduce the octonionic projective and hyperbolic plane $\mathbb{O}P^2$ through the use of Veronese vectors. Then we focus on their relation with the exceptional Jordan algebra $\mathfrak{J}_3^{\mathbb{O}}$ and show that the Veronese vectors are the rank-one elements of the algebra. We then study groups of motions over the octonionic plane recovering all real forms of G_2, F_4 and E_6 groups and finally give a classification of all octonionic and split-octonionic planes as symmetric spaces.

MSC: 17C36, 17C60, 17C90, 22E15, 32M15
Keywords: Exceptional Lie groups, Jordan algebra, octonionic projective plane, real forms, Veronese embedding

Contents

1. Introduction

The study of the exceptional Jordan algebra and its complexification has been of interest in recent papers of theoretical physics. Todorov, Dubois-Violette [18] and