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REALIZATIONS OF SUBGROUPS OF TYPE D_8 OF CONNECTED EXCEPTIONAL SIMPLE LIE GROUPS OF TYPE E_8

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Introduction

In [4], we realized subgroups of type A_8, $A_4 \times A_4$ and $A_2 \times E_6$ of the compact simple Lie group of type E_8. In this paper, we shall realize subgroups of type D_8 of the compact and non-compact simple Lie groups of type E_8.

In [5], [6], [10] and [11], Yokota and some members of his school found all involutive automorphisms σ and realized subgroups G^σ of fixed points of connected exceptional simple Lie groups G explicitly, which correspond to Berger's result of simple Lie algebras [2]. But in their results concerning subgroups of type D_8 of Lie groups of type E_8, the definition of subgroups are not clear and proof of isomorphism is very difficult in comparison with their other results.

We improve those results in this paper. Our improvement make results that are more simple and intelligible. Hence they are of widely applicable to symmetric spaces. Our results are as follows.

type	G	G^σ	
E_8^C	E_8^C	$Ss(16, C)$	Theorem 6.1
E_8 (compact)	$(E_8^C)^\tau$	$Ss(16)$	Theorem 6.6(1)
$E_{8(8)}$	$(E_8^C)^{\tau\varepsilon}$	$Ss(16)$	Theorem 6.6(2)
	$(E_8^C)^{\tau\varepsilon_1}$	$Ss(8,8) \times 2$	Theorem 6.8
	$(E_8^C)^{\tau\varepsilon J}$	$Ss^*(16) \times 2$	Theorem 6.11(2)
$E_{8(-24)}$	$(E_8^C)^{\tau\varepsilon_1\gamma_1}$	$Ss(4,12)$	Theorem 6.9
	$(E_8^C)^{\tau J}$	$Ss^*(16) \times 2$	Theorem 6.11(1)

In §2, §3 and §4, we make a new realization of exceptional Lie algebras

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