

ON SOME STRUCTURAL PROPERTIES OF SEMIDIRECT SUMS OF $\mathfrak{so}(3)$ AND ABELIAN LIE ALGEBRAS*

RUTWIG CAMPOAMOR-STURSBURG

*Instituto de Matemática Interdisciplinar, UCM, Plaza de Ciencias 3, E-28040
Madrid, Spain*

Abstract. Various structural properties of semidirect sums of the rotation Lie algebra of rank one and an Abelian algebra described in terms of real representations with at most two irreducible constituents are obtained. The stability properties of these semidirect sums are studied by means of the cohomological and the Jacobi scheme methods.

MSC: 17B05, 17B56, 17B99

Keywords: cohomology, contraction, real representation, stable Lie algebra

CONTENTS

1. Introduction	89
2. Stability of Lie Algebras and Cohomology	89
2.1. Cohomology of Semidirect Sums of $\mathfrak{sl}(2, \mathbb{C})$ Revisited	91
3. Semidirect Sums of $\mathfrak{so}(3)$ and Abelian Algebras	93
3.1. The Lie Algebras \mathfrak{g}_J^{II}	95
4. Describing Representations $R_J^I \oplus \Gamma_0$ and $R_J^{II} \oplus \Gamma_0$	98
5. Describing Representations with Two Components	99
6. Final Remarks	103
Acknowledgements	104
References	104

*Dedicated to the memory of Robert Lutz.