Geometry,
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THE NEWMAN JANIS ALGORITHM: A REVIEW OF SOME RESULTS

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Abstract. In this paper we review some interesting results obtained through the Newman-Janis algorithm, a solution generating technique employed in General Relativity. We also describe the use of this algorithm in different theories, namely f(R), Einstein-Maxwell-Dilaton gravity, Braneworld, Born-Infeld Monopole and we focus on the validity of the results.

1. Introduction

In order to find new solutions of Einstein field equations, several methods were introduced, such as the Newman-Penrose formalism and a technique founded by Newman and Janis [15]. In the recent years, many papers have appeared focusing on the Newman-Janis algorithm, considered as a solution generating technique which provides metrics of reduced symmetries from symmetric ones. Our aim is to give a summary of the use of this method and to review the most interesting applications in different gravity theories.

The outline of this paper is as follows: in Section 2, we present the general procedure of the Newman-Janis algorithm (henceforth NJA). In Section 3, we review the interesting attempts made in General Relativity, focusing on the most intriguing results. In Section 4, we have analyzed how to apply this technique to the f(R) modified theories of gravity, by following the procedure used in GR. Then, in Section 5, an application of NJA in the Einstein-Maxwell-dilaton-axion Gravity is discussed. Finally we draw some conclusions.

2. A Brief Description of the Method

Following [15], we show how it is possible to derive the Kerr solution from the Schwarzschild one through the NJA. Let us start by writing the **Schwarzschild**