Electromagnetic quasinormal modes of *D*-dimensional black holes II

A. López-Ortega

Abstract By using the sixth order WKB approximation we calculate for an electromagnetic field propagating in *D*-dimensional Schwarzschild and Schwarzschild de Sitter (SdS) black holes its quasinormal (QN) frequencies for the fundamental mode and first overtones. We study the dependence of these QN frequencies on the value of the cosmological constant and the spacetime dimension. We also compare with the results for the gravitational perturbations propagating in the same background. Moreover we compute exactly the QN frequencies of the electromagnetic field propagating in *D*-dimensional massless topological black hole and for the charged *D*-dimensional Nariai spacetime we calculate exactly the QN frequencies of the coupled electromagnetic and gravitational perturbations.

Keywords Schwarzschild (de Sitter) · Topological black hole · Nariai · Quasinormal modes

1 Introduction

The quasinormal modes (QNMs) are characteristic oscillations of a black hole that depend on its parameters, for example, the mass, electric charge, and angular momentum. For an asymptotically flat black hole these modes are purely ingoing near the event horizon and purely outgoing at infinity. For other black holes the

A. López-Ortega (✉)
Facultad de Ciencias, Universidad de Colima, Bernal Díaz del Castillo No. 340,
Colima, Colima, Mexico
e-mail: alopezortega@ucol.mx

A. López-Ortega
Centro de Investigación en Ciencia Aplicada y Tecnología Avanzada del IPN,
Calzada Legaria # 694, Col. Irrigación, C.P. 11500 Mexico, D.F., Mexico
e-mail: alopezortega@gmail.com