ABSORPTION BY THE DRAINING BATHTUB: ANALYTICAL APPROACH

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The draining bathtub is a three-dimensional (one time-like and two space-like) analogue model of a rotating black hole. Black holes are solutions of the Einstein's equations. These equations describe the dynamics of the gravitational field in the presence of matter and/or energy. Even though the draining bathtub is not a gravitational system nor satisfies the Einstein's equations, it possesses the same causal structure of a black hole. In the present work we obtain an analytical expression for the absorption cross length of the draining bathtub in all range of frequencies. Since we are dealing with the scalar field, we need to solve the Klein-Gordon equation, which radial solutions are given in terms of Heun functions, used to compose the expressions of our analytical results.