

Abstract: The core of this thesis is the analysis of accelerating black hole solution with the NUT parameter, which was found by Chng, Mann and Stelea in 2006, and related spacetimes. The original work consists of three interconnected parts. In the first chapter we study the Taub-NUT solution, in particular the nature of its pathological axes, and we include a number of visualizations. In the second chapter we investigate the accelerating Taub-NUT solution, we present it in a new form, and we discuss its “deviation” from the Plebański-Demiański class of solutions. To see the differences more clearly, in the final chapter we put also the Plebański-Demiański metric into a completely new factorized form. The work is concluded by discussion of special subcases, from which it is clearly seen that the Plebański-Demiański class does not contain the accelerating Taub-NUT solution.