عنوان مقاله:

Thermodynamics of nonlinearly charged black holes in the Brans–Dicke modified gravity theory

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خلاصه مقاله:

AbstractIn this work, the charged black hole solution to the Brans–Dicke gravity theory in the presence of the nonlinear electrodynamics has been investigated. To simplify the field equations, a conformal transformation has been introduced which transforms the Brans–Dicke–Born–Infeld Lagrangian to that of Einstein-dilaton–Born–Infeld theory. A new class of (n+۱)documentclass[۱۲pt]{minimal} usepackage{amsmath} usepackage{wasysym} usepackage{amsfonts} usepackage{amssymb} usepackage{amsbsy} usepackage{mathrsfs} usepackage{upgreek} setlength{oddsidemargin}{-۶۹pt} egin{document}(n+۱)end{document}-dimensional black hole solution has been constructed out as the exact solution to the Brans–Dicke theory in the presence of the Born–Infeld nonlinear electrodynamics. The physical properties of the solutions have been studied. The black hole charge and temperature have been calculated making use of the Gauss's law and the concept of surface gravity, respectively. Also, the black hole mass and entropy have been obtained from geometrical methods. Trough a Smarr-type mass formula as a function of the black hole charge and entropy the black hole temperature and electric potential, as the intensive parameters conjugate to the black hole entropy and charge, have been calculated. The consistency of results of the geometrical and thermodynamical approaches confirms the validity of the first law of black hole thermodynamics for this new black hole solution. Finally, making use of the ensemble canonical method, the local stability or phase transition of the new (n+۱)documentclass[۱۲pt]{minimal} usepackage{amsmath} usepackage{wasysym} usepackage{amsfonts} usepackage{amssymb} usepackage{amsbsy} usepackage{mathrsfs} usepackage{upgreek} setlength{oddsidemargin}{-۶۹pt} egin{document}(n+۱)end{document}-dimensional Brans–Dicke–Born–Infeld black hole solution has been analyzed.

کلمات کلیدی:

Brans–Dicke modified gravity theory, Charged black holes, Born–Infeld electrodynamics, Higher, dimensional black holes

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