Criticality of thermodynamic curvatures for $D \rightarrow 4$ consistent Einstein-Gauss-Bonnet black holes

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Abstract

In this paper, using Arnowitt-Deser-Misner (ADM) decomposition formalism, we first obtain a neutral black hole solution for consistent $D \rightarrow 4$ Gauss-Bonnet gravity. Then, we study its thermodynamic properties near the critical point by employing new formalism of thermodynamic geometry (NTG). More precisely, critical exponents of the number density difference Δn, the isothermal compressibility $\kappa_T P_c$, the normalized intrinsic R_N, and the normalized extrinsic K_N curvatures are calculated near the critical point for the small/large black holes phase. Our findings show that the critical amplitude of the normalized thermodynamic curvatures are independent of the Gauss-Bonnet coupling values that indicates their universal feature.

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