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Exact solutions of nonlinear superstring models and black holes without singularities

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Abstract. We deal with the classical black hole dynamics, general properties of supersymmetric black holes, a new statistical explanation of the black hole entropy in the context of superstring theory, and consider the relationship between their thermodynamics at different scales. We argue that superstring theory is able to give an explanation of black hole thermodynamics in an arbitrary spacetime dimension. A purely geometric method for constructing exact solutions of nonlinear superstring models is introduced. It is then possible to obtain nice relations between superstring and black hole geometries in multidimensional gravity and give a perfect explanation of black hole thermodynamics in terms of superstring theory. We also find a useful relation between the geometric parameters of black holes and some topological invariants which are analogous to instanton charges for self-dual Yang-Mills solutions in four-dimension.

Keywords: superstrings, black holes, exact solutions, complex supermanifolds

MSC numbers: 83C55, 83C57

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