

Temperature Profile of Black Hole Accretion Disc with Magnetic Coupling

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Abstract: Two new mapping relations between the angular coordinate on the black hole (BH) horizon and radial coordinate on the disc are given according to the requirement of general relativity and Maxwell's equations, and the effects of magnetic coupling (MC) on temperature of accretion disc are investigated by comparing with pure accretion. It is shown that the MC effects on the temperature profile are related intimately to the BH spin, and the influence on the peak value of disc temperature based on the modified mapping relations is not as great as that based on the linear mapping. The peak value and the corresponding radius of peak value ring of disc temperature do not increase monotonically as the increasing spin of BH, each containing a maximum for the fast-spinning BH. The value ranges of the bolometric luminosity and color temperature of the disc are both extended by the MC effects.

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Key words: black hole, accretion disc, magnetic coupling

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