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Relativistic Effects of Rotation

Authors : Yin Rui, Yin Ming, Wang Yang

Abstract : For a rotational reference frame of the theory of special relativity, the critical radius is defined as the distance from the axis to the point where the tangential velocity is equal to the speed of light, and the critical cylinder as the set of all points separated from the axis by this critical radius. Based on these terms, two relativistic effects of rotation are discovered: (i) the tangential velocity in the region of Outside Critical Cylinder (OCC) is not superluminal due to the existence of space-time exchange; (ii) some of the physical quantities of the rotational body have an opposite mathematic sign at OCC versus those at Inside Critical Cylinder (ICC), which is termed as the Critical Cylindrical Effect (CCE). The laboratory experiments demonstrate that the repulsive force exerted on an anion by electrons will change to an attractive force by the electrons in precession while the anion is at OCC of the precession. Thirty-six screenshots from four experimental videos are provided. Theoretical proofs for both space-time exchange and CCE are then presented. The CCEs of field force are also discussed.

Keywords : critical radius, critical cylindrical effect, special relativity, space-time exchange
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