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Rigorous derivation of the self-force and momentum of a charged particle in the hyperbolic motion TEYOUN KANG, MIN SUP HUR[1], Ulsan National Institute of Science and Technology — The problem of the classical electrodynamics is that the equation of motion including the self-force of a charged particle is still incomplete. For examples, there are a few popular theory models such as Lorentz-Abraham-Dirac and Landau-Lifshitz equations, but the causality violation or contradiction is not avoided in those models. In particular, the radiation reaction from a point charge in the hyperbolic motion has not been described successfully; the reaction term vanishes, although it actually radiates, leading to apparent violation of the energy conservation. Furthermore, the self-force of a point charge is strongly related to the renormalization, which is still unclear in QED system. Owing to the recent development of ultra-intense laser facilities, great interest in this problem is emerging rapidly, as the radiation reaction of charged particles is expected to be observed in much stronger fields. In this poster, we present a unique charge distribution that we named 'point-like conductor (PLC),' with a derivation of the self-force and momentum of PLC by applying the Rindler coordinates. Eventually we suggest a modified equation of motion for a point particle by assuming the particle and PLC are equivalent, and we explain the difference between previous and modified results.

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