Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Self-force of a Lorentz-contracted charged-sphere under uniform circular motion TEYOUN KANG, MIN SUP HUR[1], Ulsan Natl Inst of Sci Tech
— The radiation reaction in classical electrodynamics has not been completely solved. One of the main difficulties has been the unacceptable causality violation known as runaway or pre-acceleration solution. Even after the Landau-Lifshitz model resolved them, still there are some issues such as energy conservation of photons and a particle under the uniform acceleration. To solve this, we recently suggested a 'Lorentz-contracted charged-sphere', where the radiation reaction and the corresponding energy loss in a uniform acceleration can be successfully explained by effective mass change. This result motivated us to investigate other motions of the same model of Lorentz-contracted sphere. In this paper, we present our new calculation of the self-force exerting on the Lorentz-contracted sphere under the uniform circular motion. The calculation result implies that the radiation reaction for circular motion is related to the retarded time. In addition, we discuss which size of the extended particle would be appropriate.

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Date submitted: 29 Jun 2020 Electronic form version 1.4