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Interpolating Lorentz force equation and solution between the instant form dynamics and the light-front dynamics

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When the electromagnetic field is applied to a charged particle, the particle motion is described by the Lorentz force equation which reveals the connection between the electromagnetic field strength tensor and the Lorentz transformation generators represented by the boost and the rotation. We interpolate the Lorentz force equation between the instant form dynamics and the light-front dynamics and investigate the utility of the interpolation in solving the Lorentz force equation. We discuss how effectively the interpolation can gauge the effect of the kinematic generators saving dynamical efforts in solving the Lorentz force equation. We present how the interpolation can be utilized to enhance and suppress the kinematic and dynamic portion of the electromagnetic fields, respectively, and exemplify its effectiveness by discussing the link between the electromagnetic field strength tensor and the Lorentz transformation generators.

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