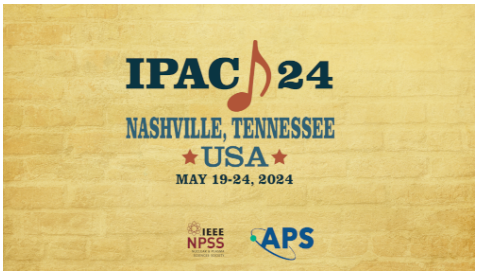

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A faster algorithm to compute lowest order longitudinal and transverse resistive wall wake for non-ultrarelativistic case

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With the development of the steady state micro bunching (SSMB) storage ring, its parameters reveal that the ultra relativistic assumption which is wildly used is not valid for the electron beam bunch train, which has length in the 100 nm range, spacing of 1 μm and energy in hundreds MeV range. The strength of the interaction between such bunches and the potential instability may need careful evaluation. At the same time, the effect of the space charge inside a single bunch due to space charge effect also needs to be considered. In this article, we reorganized the lowest-order longitudinal wakefield under non-ultra relativistic conditions, and modified the inconsistent part in the theoretical derivation in some essays of the lowest-order transverse wakefield. We present the modified theoretical results and analysis. Then based on the result we have derived, we give a algorithm which is thousands time faster than direct calculation. It lays foundation in future research.

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