

Title: A conceptual pre-injector design for the KEK-ERL test accelerator

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A conceptual design for a test accelerator based on an energy recovery linac scheme toward the next generation light source at KEK. High bright electron beams will be derived from the test accelerator up to a maximum energy of 200 MeV using L-band superconducting accelerating cavities installed in two cryomodules. It is of great importance to design a pre-injector in order to generate the high bright electron beams with low emittances. A new simulation code is under development to simulate the beam dynamics and to optimize the beam characteristics at the bunching section. The code simulates the two-dimensional (transverse and longitudinal) dynamics of the electron beams based on the well-known envelope equations taking into account space charge effect. The purpose of this code is not to rigorously simulate the 3-dimensional particle dynamics such as the simulation code "Parmela", but to quickly optimize the design parameters of accelerator components. The validation of this new code has been performed by comparing with the results obtained from the "Parmela" code using the present design parameters of the pre-injector of the test accelerator. In this report, the development and the present status of the new simulation code is presented in detail.