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Application and comparative analysis of the APES_CBI module in BEPC-II experimental results

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In this paper, we delve into the application and comparative analysis of the Accelerator Physics Emulation System Cavity-Beam Interaction (APES_CBI) module within the BEPC-II (Beijing Electron-Positron Collider) experiments. We developed the APES_CBI module as an advanced time-domain solver, specifically designed to analyze RLC circuits driven by beam and generator currents and to simulate the dynamic responses and synchrotron oscillations of charged particles within the cavity.

We begin by discussing our method for solving RLC parallel circuits, followed by an explanation of the logical architecture of our program. In the second part, we detailed our simulation results, starting with the BEPC-II electron ring. By comparing these results with experimental data, we validate the reliability of our simulations, showcasing our module's ability. Additionally, we extend our simulations to the CEPC Higgs mode on-axis injection conditions and studied the transient phase response to the sudden change of beam pattern.

Footnotes

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