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P5.2023 The ZPIC educational code suite

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Particle-in-Cell (PIC) codes are used in almost all areas of plasma physics, such as fusion energy research, plasma accelerators, space physics, ion propulsion, and plasma processing, and many other areas. In this work, we present the recent developments of the ZPIC educational code suite, a new initiative to foster training in plasma physics using computer simulations. ZPIC includes a set 1D/2D fully relativistic electromagnetic PIC codes (with both finite difference and spectral field solvers), as well as 1D electrostatic. These codes are completely self-contained and require only a standard laptop/desktop computer with a C99 compiler to be run. The code suite also includes Python interfaces for all the codes, allowing for simulations to be totally controlled from within this environment. Using this feature we have developed a set of Jupyter (Python) notebooks with well-documented example problems, that can be used to illustrate several textbook and advanced plasma mechanisms and including instructions for parameter space exploration. We also invite contributions to this repository of test problems that will be made freely available to the community provided the notebooks comply with the format defined by the ZPIC team.
The code suite is freely available and hosted on GitHub at: https://github.com/zambzamb/zpic

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