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Title:Using CAD technique to realize the complex three-dimensional modeling for PIC simulation
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Abstract:Expanding application of computer-aided design (CAD) technique to the particle-in-cell (PIC) simulation will greatly make a large space towards the practicability of PIC method. Using object-oriented and modularized design methods, a three-dimensional CAD system for PIC simulation is realized based on the analysis of the requirement of modeling complex vacuum electronic microwave sources, millimeter-wave sources, and terahertz sources. The CAD system can visually model various complex devices and generate the parameter description file for the kernel calculation. Using this system, a magnetically insulated transmission line oscillator (MILO) and an extended interaction oscillator (EIO) are modeled and simulated in cylindrical and Cartesian coordinates respectively. The results show the practicability of the three-dimensional CAD system for PIC simulation.
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Controlled terms:Computer aided design - Particle beam dynamics - Three dimensional computer graphics
Uncontrolled terms:CAD system - Cartesian coordinate - Complex devices - Extended interaction oscillators - Large spaces - Magnetically insulated transmission line oscillator - Microwave sources - Modularized design - Object oriented - Particle-in-cell simulations - PIC method - PIC simulation - Terahertz sources - Three-dimensional CAD systems - Three-dimensional modeling - Vacuum electronics
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