

Abstract Submitted
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PARSEK: A Parallel Implicit PIC Code STEFANO MARKIDIS, LANL, GIOVANNI LAPENTA, LANL — CELESTE3D [1] has been an extremely successful tool for space plasma simulation. CELESTE3D is based on fully kinetic ions and electrons and on an implicit formulation of both field solver and particle mover. The code was designed in the early 1990s and adhered to the software infrastructures of the time. Furthermore the code had general geometry and grid adaptation, a feature key to fusion applications. However, the use of the code was largely limited to space and astrophysics applications. But a new age has dawned, a new successor of CELESTE has been fully developed and tested: PARSEK. PARSEK is based on the same algorithmic approach as CELESTE but it has a number of new features: 1) The particle mover and field solver are now relativistic; 2) The software infrastructure is completely new, based on a component-based software architecture using an object-oriented language (C++ or Java); 3) All components are fully parallelized using MPI. We present the new code, its benchmark tests and some sample applications.

[1] G. Lapenta, J.U. Brackbill, W.S. Daughton, *Phys. Plasmas*, 10, 1577 (2003).

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