

Abstract Submitted
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Relativistic	Implicit	Moment	Method
CESARE TRONCI, LANL/TERA Foundation, Novara, Italy, GIANLUCA ZUCCARO, STEFANO MARKIDIS, GIOVANNI LAPENTA, LANL — Many plasma physics problems in astrophysics, laboratory and space systems require the development of suitable relativistic plasma simulation methods. Collisionless particle-in-cell (PIC) methods are often used to this purpose. We investigate here the possibility of a relativistic extension of an existing implicit PIC code (CELESTE), based on a moment equation closure model (1). Four possible ways of formulating the relativistic moment expansion are analysed from a purely numerical point of view, studying truncation errors and stability properties. Based on the analysis a new method is implemented into the 1D pilot code, PARSEK (2). The classical equation of motion from CELESTE is modified in order to keep a similar implicit integration method. The field solver is also presented, taking into account the previous results of the classical version.			

(1) J.U. Brackbill, D.W. Forslund, J. Computat. Physics, 46, 271, 1982. (2) S. Markidis, G. Lapenta, W.B. VanderHeyden, Z. Budimlic, Concurrency Comput Practice Experience, 17, 821, 2005.

Giovanni Lapenta
LANL

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