Abstract Submitted
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Calculation of the Nanbu-Trubnikov Kernel: Implications for Numerical Modeling of Coulomb Collisions[1] A.M. DIMITS, B.I. COHEN, LLNL, C.M. WANG, R.E. CAFLISCH, Y. HUANG, UCLA — We investigate the accuracy of and assumptions underlying the numerical binary Monte-Carlo collision operator due to Nanbu [K. Nanbu, Phys. Rev. **E 55** (1997)]. The numerical experiments that resulted in Nanbu's parameterized collision kernel are approximate realizations of the Coulomb-Lorentz pitch-angle scattering process, for which an analytical solution is available. It is demonstrated empirically that Nanbu's collision operator quite accurately recovers the effects of Coulomb-Lorentz pitch-angle collisions, or processes that approximate these even for very large values of the collisional time step. An investigation of the analytical solution shows that Nanbu's parameterized kernel is highly accurate for small values of the normalized collision time step, but loses some of its accuracy for larger values of the time step. Finally, a practical collision algorithm is proposed that for small-mass-ratio Coulomb collisions improves on the accuracy of Nanbu's algorithm.

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