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Sustainable numerical scheme for molecular dynamics simulation of the dusty plasmas in an external magnetic field

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Abstract content
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The method, which allows one to carry out computer simulation of system of the charged particles in a strong external homogeneous magnetic field with the time step that is independent on the Larmor oscillation time, was generalized for the case of the presence of the surrounding background for the moving particles. An example of such a system is complex dusty plasma. In this type of complex plasma charged microparticles of solid state move in the background plasma of ions, electrons and atoms (molecules). Under the influence of the magnetic field B particle with specific charge q / m performs the rotation at the Larmor frequency. It is also influenced by the friction force that occurs when it moves in the external environment. In work [1] on the basis of the Taylor expansion of the position and velocity vectors the numerical scheme, which is resistant to a change in time step at a large external magnetic fields, was obtained. The time step in this scheme is independent on the Larmor period of oscillation. In our work we have put the frictional force in the Velocity Verlet scheme, performing all these steps, described in [1], for obtaining of the sustainable scheme. We deduced the new stable second-order numerical scheme for solving the equations of motion of particles in an external homogeneous stationary magnetic field and the background environment.
In this scheme a choice of the time step is not limited by the relation between time step and Larmor frequency. So, correctly taking into account a strong magnetic field and friction force, which both depend on the particles velocities, we obtained solution resistant to a change in the time step within the second-order Velocity Verlet propagation scheme.

References

1. Q. Spreiter and M. Walter, J. Comput. Phys. 152, 102 (1999).

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