ION DRAG FORCE ON A CHARGED MACROPARTICLE IN COLLISIONLESS PLASMA

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S u m m a r y

The problem of calculating the ion drag force acting on a charged macroparticle in collisionless flowing plasma is studied by using an approach based on the direct numerical solution of the Vlasov kinetic equations for plasma components. A uniform plasma flow past a spherical macroparticle is considered. The computations are carried out for different particle sizes and different flow velocities. On the basis of the obtained results the effect of particle size on the ion drag force is analyzed. It is shown that when the particle size is much less than the Debye length in plasma, the ion drag force can be calculated with good accuracy by means of the conventional binary collision approach. A modified version of the binary collision approach is proposed to calculate the ion drag force in the case where the particle size becomes comparable to the Debye length in plasma. It is shown that there is a reasonable agreement between the results obtained using the numerical solution of the kinetic equations and that obtained by the modified binary collision approach.