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Acceleration of cold ions at separatrices during magnetic reconnection

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Acceleration of cold ions by electrostatic in-plane potential drop at reconnection separatrices is studied by means of 2D PIC simulation and test-particle simulations. We find that cold ions perform ExB drift motion on distant separatrices ahead of the reconnection front where reconnection electric field is close to zero. Energization of cold ions at the exhaust boundaries occurs in the presence of the localised Hall electric field and homogeneous reconnection electric field. The ratio of the Hall electric field gradient scale to the ion gyroradius determines the resulting energy gain of ions with different initial thermal velocity. Cold particles will increase the magnetic moment while hot ions will be phase-scattered on entry into potential well. Hall term in Ohm's law for cold ion reconnection is suppressed by electric field of ion convection. Reconstructed force balance across the exhaust display the crucial role of ion inertial term at the separatrices.