Particle acceleration in a reconnecting current sheet with multiple X- and O-nullpoints

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We investigate particle acceleration in 3D reconnecting current sheets (RCSs) containing multiple O- and X-nullpoints. The inclusion of multiple O-nullpoints, or magnetic islands, combined with different dynamics (coalescent or squashed islands) reveals the following points: Acceleration of protons and electrons in the current sheet with multiple X-nullpoints, or magnetic islands associated with O-nullpoints with a strong guiding field remains asymmetric towards the midplane. Both types of particles mainly gain energy either in a vicinity of X-nullpoints or inside O-nullpoints, depending on the initial energy of particles. Strongly accelerated particles can escape O-nullpoints, or magnetic islands, only through the neighbouring X-nullpoints. As a result, electron clouds are formed about the X-nullpoints between the magnetic islands. The particles with sufficient energy to leave the RCS escape along the midplane and never across the midplane. The energy gains in coalescent islands are smaller than in the squashed islands when the two nearby O-nullpoints are moving towards each other. Under certain conditions, the particles are shown to gain sub-relativistic energies in a single O-nullpoint. Electrons are shown to form clouds about X-nullpoints between the magnetic islands where they become ejected. Particle acceleration in 3D RCSs with multiple X- and O-nullpoints is probed with some observational features in the solar corona and heliosphere.