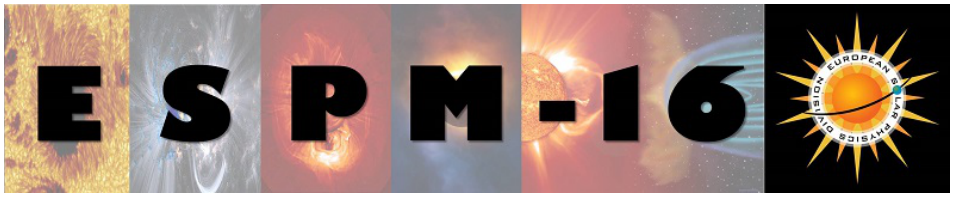

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2.5D MHD Simulation of Magnetic Islands Evolving toward Solar Flare Loops

Thursday, 9 September 2021 09:52 (13 minutes)

During solar eruptions, magnetic islands carried by reconnection downflows will encounter second reconnection process when colliding with the loop top. To investigate the second reconnection of magnetic islands, we perform high-resolution 2.5-dimensional MHD simulations of an eruption current sheet (CS) under the high-Lundquist-number and low-β coronal environment. The fast reconnection scheme triggered by the plasmoid instability produces various downflow magnetic islands. The rates of the second reconnection of magnetic islands are of the same order as in CS, which also implies that significant magnetic energy can be released on the loop-top region. The intermittent second reconnection of magnetic islands on the loop-top also corresponds to some quasi-periodic characteristics of the solar flare observations. Our results thus imply that the second reconnection of magnetic islands might provide another important mechanism for particle acceleration and loop-top heating, and can explain plenty of small-scale oscillation properties in observations.

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