

Full-particle simulation study on the magnetic island coalescence process: Size effect and guide field effect

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There has been significant progress in the research of magnetic reconnection process recently, however, coalescence process of magnetic islands is not well studied. Here we perform a series of two-dimensional full particle simulations to address this issue. The system size is taken to be large enough so that the variation in the morphology of the coalescence process is observed as the size of the islands subject to coalescence enlarge in time. Another focus of the study is on the effects of guide field. When the guide field is comparable to the reconnecting component, it is seen to slow down the coalescence. The islands expands vertically and vortex-like electron flow pattern appears inside them before they coalescence to a larger island. How these two factors affect the particle energization will be discussed.