

2010 Fall  
Meeting

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0800h

### SM51C-1836 Poster

High-Lundquist Number Resistive MHD Simulations of Turbulent  
Magnetic Reconnection with Secondary Island Formation and  
Enhanced Reconnection Rate

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We present our latest results based on large-scale two dimensional resistive magnetohydrodynamic (MHD) simulations for the magnetic reconnection process in the configuration of island coalescence instability. These simulations are performed using a fairly standard pseudo spectral code, which has been well tested for accuracy, convergence, and compared well with codes using other methods. Cases with a range of Lundquist number  $S$  are run using resolutions up to  $8192^2$  and thus with  $S$  up to  $2 \times 10^5$ . It is found that the reconnection rate is consistent with the Sweet-Parker theory with no tearing instability of the Sweet-Parker current sheet or secondary island (plasmoid) formation when simulations are well resolved and without external noise. However, secondary islands have been observed to form, with faster reconnection rate in simulations superimposed with turbulence (noise). We will present results on the scaling of reconnection rate with  $S$ , as well as turbulence levels. This work is supported by a NASA grant NNX08BA71G, and a NSF grant AGS-0962477.

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