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How Alfvén waves set the large scale structure of magnetic reconnection. HARSHA GURRAM, JAN EGEDAL, University of Wisconsin - Madison, WILLILAM DAUGHTON, Los Alamos National Laboratory — Kinetic Alfvén waves (KAWs) have been postulated as a possible source of energy for the aurora[1]. Past studies have shown that they propagate super-Alfvénically for distances $\sim 10R_e$ without significant damping [2]. However, from our study of Hall field profiles i.e $B_y(x,t)$ and $B_y(\psi,t)$ obtained from PIC simulation with domain $200d_i \times 30d_i$ and open boundary conditions, we observe that the large scale structure is carried by waves which are super-Alfvénic ($\sim 2V_a$) near the X-line where they are generated, as they travel into the exhaust for $\sim 5R_e$ their propagation velocity decreases and become Alfvénic ($\sim 1V_a$). In the profiles of $B_y(x,t)$ we observe multiple B_y structures in addition to the peak Hall field as the reconnection progresses which cause increase in parallel wavelengths, hence decrease in corresponding speeds. The waves have transverse propagation speeds greater than inflow as a result of which Hall field was observed to spread into the inflow. These waves are observed to carry enough energy which may be important for generation auroras as the precipitate in the ionosphere. Shay, M.A. *et al.* PRL, 107(6), 065001 (2011). Sharma, P. *et al.* JGR: Space Physics ,123, 341349 (2018).

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