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# Electron acceleration due to lower hybrid waves in reconnection regions

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Magnetic reconnection is widely believed to produce significant acceleration of particles to high energies. Little agreement exists as to how this is done. Lower hybrid (LH) waves are common in Hall-MHD simulations and Wind observations of current sheets and magnetic reconnection regions. It is suggested here that LH waves are important in producing electron acceleration in reconnection regions: LH waves produced by the LH drift instability resonantly accelerate electrons parallel to the magnetic field via so-called ‘‘lower hybrid drive”. Analytic theory is used to support this suggestion, finding that the mechanism can accelerate electrons up to about $c/2$ under solar and magnetotail conditions, not inconsistent with recent magnetotail observations (Oieroset et al., Phys. Rev. Lett., 89(19), 195001, 2002), and that it should be much more efficient under solar conditions. Recent numerical simulations by Drake et al. (Science, 299, 873, 2003) show both LH waves and an accelerated electron tail reminiscent of LH drive, as well as electron holes. It is shown that the LH waves are resonant with the electron tail, so that LH drive likely produces some of the electron acceleration found in the simulations.