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Physical Origin of the Quadrupole Out-Of-Plane Magnetic Field in Hall-MHD Reconnection[1] DMITRI UZDENSKY, RUSSELL KULSRUD, Princeton University and CMSO — A quadrupole pattern of the out-of-plane component of the magnetic field inside a reconnection region is seen as an important signature of the Hall-MHD regime of reconnection. It has been first observed in numerical simulations (e.g., Mandt et al. 1994) and just recently confirmed in the MRX experiment (Ren et al. 2005). In this study, we analyze the physical origin of the quadrupole field and show that it can be traced to the current of electrons flowing in and out of the inner part of the reconnection region, as required by charge neutrality. We also discuss the role the quadrupole field plays in the overall dynamics of the reconnection process.

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