Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Toroidal current asymmetry and boundary conditions in disruptions[1] HENRY STRAUSS, HRS Fusion — It was discovered on JET [1] that disruptions were accompanied by toroidal asymmetry of the plasma current. The toroidal current asymmetry ΔI_ϕ is proportional to the vertical current moment ΔM_{IZ}, with positive sign for an upward vertical displacement event (VDE) and negative sign for a downward VDE. It was claimed [2] that this could only be explained by Hiro current. It is shown that instead it is essentially a kinematic effect produced by the VDE displacement of a 3D magnetic perturbation. This is verified by M3D simulations. The simulation results do not require penetration of plasma into the boundary, as in the Hiro current model [2]. It is shown that the normal velocity perpendicular to the magnetic field vanishes at the wall, in the small Larmor radius limit of electromagnetic sheath boundary conditions [3]. Plasma is absorbed into the wall only via the parallel velocity, which is small, penetrates only an infinitesimal distance into the wall, and does not affect forces exerted by the plasma on the wall.

[1] S.N. Gerasimov et al. Nucl. Fusion **54** 073009 (2014).
[2] L. E. Zakharov, Phys. Plasmas **15** 062507 (2008).
[3] H. R. Strauss, Physics of Plasmas **21**, 032506 (2014).

[1]Supported by USDOE and ITER.

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Date submitted: 10 Jul 2014 Electronic form version 1.4