

Abstract Submitted
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Hiro and Evans currents in Vertical Disruption Event¹ LEONID ZAKHAROV, Princeton University, PPPL, XUJING LI TEAM, SERGEI GALKIN TEAM — The notion of Tokamak Magneto-Hydrodynamics (TMHD), which explicitly reflects the anisotropy of a high temperature tokamak plasma is introduced. The set of TMHD equations is formulated for simulations of macroscopic plasma dynamics and disruptions in tokamaks. Free from the Courant restriction on the time step, this set of equations is appropriate for high performance plasmas and does not require any extension of the MHD plasma model. At the same time, TMHD requires the use of magnetic field aligned numerical grids. The TMHD model was used for creation of theory of the Wall Touching Kink and Vertical Modes (WTKM and WTVM), prediction of Hiro and Evans currents, design of an innovative diagnostics for Hiro current measurements, installed on EAST device. While Hiro currents have explained the toroidal asymmetry in the plasma current measurements in JET disruptions, the Evans currents explain the tile current measurements in tokamaks. The recently developed Vertical Disruption Code (VDE) have demonstrated 5 regimes of VDE and confirmed the generation of both Hiro and Evans currents. *The results challenge the 24 years long misinterpretation of the tile currents in tokamaks as “halo” currents, which were a product of misuse of equilibrium reconstruction for VDE.*

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Leonid Zakharov
Princeton University, PPPL

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