Investigation of electron energization mechanism during merging startups developed in UTST

K. Yamasaki[1], T. Ushiki[2], X. Guo[2], T. Sugawara[2], K. Matsuyama[2], N. Kawakami[2], A. Sato[2], Y. Fukai[2], H. Yamanaka[2], R. Tamura[2], S. Kamio[3], H. Tanabe[2], T. Yamada[4], M. Inomoto[2], Y. Ono[2]

[1]*Graduate School of Engineering, The University of Tokyo, Tokyo 113-8561, Japan*
[2]*Graduate School of Frontier Sciences, The University of Tokyo, Kashiwa 277-8561, Japan*
[3]*National Institute for Fusion Science, Toki 509-5292, Japan*
[4]*Faculty of Arts and Science, Kyushu University, Fukuoka 819-0395, Japan*

Lead-author e-mail: yamasaki@ts.t.u-tokyo.ac.jp

Electron energization mechanism during merging startup is experimentally investigated in the University of Tokyo Spherical Tokamak (UTST). Magnetic probe and Langmuir probe measurements indicate that the diffusion region extends significantly in the downstream direction and also that the size of the diffusion region is not affected by the toroidal magnetic field. Trajectory calculation using the measured profiles of magnetic field and electric field indicates that the electrons are energized by field-aligned electric field within the diffusion region. In the condition of same initial plasma current, the electron energy increases with the toroidal magnetic field.

An optimized merging startup method with longer startup phase is developed in UTST in order to enhance the plasma heating by magnetic reconnection. In the present setup, the plasmas are initiated at the null points transiently formed by the coil current and wall eddy current [1], therefore the formation time is as short as 50μsec. We will discuss the feature of the STs formed with these methods.

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