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Theoretical and numerical study on non-inductive current drive at the ECH pre-ionization BYOUNG HO PARK, JIN YONG KIM, JAE CHUN SEOL, KWANG IL YOU, National Fusion Research Institute — During the 2008's and 2009's campaign, we observed ECH driven current in ECH assisted startup experiments and ECH pre-ionization assessing experiments. A few hundreds of Am- pere was repeatedly measured before the onset of loop voltage attributing it not to the Ohmic current but to pure ECH driven current. The current was induced even in the case of vertical launch of ECH beam to the toroidal magnetic field. In this case, there is no preferable toroidal direction of electron because of symmetry. The only thing breaking the symmetry is a tiny vertical magnetic field near ECH resonance layer. The grad-B and curvature drift directions tilted slightly by the vertical field from its straight downward direction to a certain toroidal direction. It gives finite connecting length to the electrons but it differs from an electron to an electron and surely depends on toroidal direction. In this point of view, the average life time of electrons flying to a certain direction is longer than the opposite direction and this could possibly cause the electron current. If we accept this as one of the current deriving mechanism we can deduce the current for a given density and temperature. From this, we could explain the current, at least in same order, be agreed with experiments. In this work, we also discuss about the Pfirsh-Schluter current and compare it with the current here we proposing.

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