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Wall intersection of ion orbits induced by fast transport of pedestal plasma over an electrostatic potential hill in a tokamak plasma edge[1] C.S. CHANG, New York University and KAIST, S.H. HAHN[2], Department of Physics, KAIST, S.H. KU, New York University and KAIST — An edge localized mode (ELM) event is known to transport a significant portion of pedestal plasma across the separatrix, and increase the divertor heat load to a possibly intolerable level in a tokamak fusion reactor. In the present work, a large random-walk transport is introduced in a plasma edge in a guiding center orbit following code XGC [C.S. Chang, S.H. Ku, H. Weitzner, Phys. Plasmas **11**, 2649 (2004)] to understand the effect of the shear in the edge radial electric field E_r on the wall intersection location of the large-transport orbits. It is found that without an edge E_r, majority of large-diffusion induced ion orbital loss is to the outer divertor near the separatrix surface. However, with a large negative E_r in the plasma edge with the ion grad-B drift into the single null divertor, ion orbits with their kinetic energy less than the potential energy shift their wall- intersection locations to the inner divertor while those with their kinetic energy higher than the potential energy retain their wall-intersections at the outer divertor. If the ion grad-B is away from the single-null divertor, the ion orbital loss is always to the outer wall.

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[2]Present Address: Korea Basic Science Insittute

C.S. Chang
cschang@cims.nyu.edu
New York University

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