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Estimation of Kubo number and correlation length of fluctuating magnetic fields and pressure in BOUT++ edge pedestal collapse simulation JAEWOOK KIM, W.-J LEE, Department of Nuclear and Quantum Engineering, KAIST, Daejeon, Republic of Korea, HOGUN JHANG, H.H. KAANG, National Fusion Research Institute, Daejeon, Republic of Korea, Y.-C. GHIM, Department of Nuclear and Quantum Engineering, KAIST, Daejeon, Republic of Korea
— Stochastic magnetic fields are thought to be as one of the possible mechanisms for anomalous transport of density, momentum and heat across the magnetic field lines. Kubo number and Chirikov parameter are quantifications of the stochasticity, and previous studies show that perpendicular transport strongly depends on the magnetic Kubo number (MKN) [1]. If MKN is smaller than one, diffusion process will follow Rechester-Rosenbluth model [2]; whereas if it is larger than one, percolation theory [3] dominates the diffusion process. Thus, estimation of Kubo number plays an important role to understand diffusion process caused by stochastic magnetic fields. However, spatially localized experimental measurement of fluctuating magnetic fields in a tokamak is difficult, and we attempt to estimate MKNs using BOUT++ simulation data with pedestal collapse. In addition, we calculate correlation length of fluctuating pressures and Chirikov parameters to investigate variation correlation lengths in the simulation. We, then, discuss how one may experimentally estimate MKNs. [1] G. Zimbardo et al., Physical Review E, 61, 1940 (2000) [2] A. B. Rechester et al., Physical Review Letter, 40, 38 (1978). [3] M. B. Isichenko, Plasma Physics and Controlled Fusion, 33, 809 (1991).

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