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Generating synthetic 3D density fluctuation data to verify two-point measurement of parallel correlation length JAEWOOK KIM, YOUNG-CHUL GHIM, Department of Nuclear and Quantum Engineering, KAIST, Daejeon 305-701, Republic of Korea, NUCLEAR FUSION AND PLASMA LAB TEAM — A BES (beam emission spectroscopy) system and an MIR (Microwave Imaging Reflectometer) system installed in KSTAR measure 2D (radial and poloidal) density fluctuations at two different toroidal locations. This gives a possibility of measuring the parallel correlation length of ion-scale turbulence in KSTAR. Due to lack of measurement points in toroidal direction and shorter separation distance between the diagnostics compared to an expected parallel correlation length, it is necessary to confirm whether a conventional statistical method, i.e., using a cross-correlation function, is valid for measuring the parallel correlation length. For this reason, we generated synthetic 3D density fluctuation data following Gaussian random field in a toroidal coordinate system that mimic real density fluctuation data. We measure the correlation length of the synthetic data by fitting a Gaussian function to the cross-correlation function. We observe that there is disagreement between the measured and actual correlation lengths, and the degree of disagreement is a function of at least, correlation length, correlation time and advection velocity of synthetic data. We identify the cause of disagreement and propose an appropriate method to measure correct correlation length.

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