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Magnetic fluctuations during fast magnetic reconnection with a finite guide field in TS-3 plasma merging experiment AKIHIRO KUWAHATA, TAICHI ITO, BOXIN GAO, HIROSHI TANABE, MICHIAKI INOMOTO, YASUSHI ONO, Univ. Tokyo — Large amplitude magnetic fluctuations with ion cyclotron range frequency was observed inside the diffusion region during fast magnetic reconnection with a finite guide field in TS-3 plasma merging experiment. Magnetic fluctuation measurement was performed by three kinds of magnetic probe array: a radial array of pickup coils in the direction of current sheet length to measure magnetic fluctuations of reconnected field B_z , an axial array in the direction of current sheet width to measure reconnecting field $B_{//}$ fluctuations, and a 3-components ($B_{//}$, B_x , B_z) probe to measure the dispersion relation of the fluctuations. The guide field at the X-point B_x is comparable to $B_{//}$. The magnetic field variation caused by the fluctuations is larger than 10% of $B_{//}$. Reconnection rate had a positive correlation with the amplitude of fluctuations. Our numerical calculation of dispersion relation yields that Kinetic Alfvén Wave (left-handed polarization) can propagate in the vicinity of the X-point. Fluctuation measurement of 3-magnetic components suggests that the observed fluctuations are left hand polarized wave. As a consequence, the observed magnetic fluctuations with characteristic of KAW have good correlation with the enhancement of reconnection rate in the presence of a guide field.

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