Generation of electromagnetic waves by drift wave – zonal flow turbulence in magnetically confined fusion plasma W. HORTON, C. CORREA, UT Austin, IFS, J. KIM, U of Wisconsin, G.D. CHAGELISHVILI, V.S. AVSARKISOV, R.G. CHANISHVILI, GENAO, Chavchavadze State U, M.Nodia Inst. of Geophys. — According to recent experiments [1,2], magnetically confined fusion plasma “drift wave – zonal flow turbulence” gives rise to broad bend of electromagnetic waves. Ref. [1] reports abrupt changes in magnetic turbulence during L–H transitions in JET plasmas, i.e. appearance of broad spectra of electromagnetic waves, when zonal flow comes into play. Alfvénic fluctuations appear from ExB flow driven turbulence in experiments on the Large Plasma Device (LAPD) at UCLA [2]. We explain the generation of EM waves in DW-ZF systems on an example of LAPD experiments. Our research is based on a break-through by the hydrodynamic community in the 1990s in understanding the physics of spectrally stable nonuniform flows; these flows are non-normal and result in linear transient growth of perturbations and their coupling. The mode linear coupling in shear flows causes the generation of electromagnetic waves in the considered DW-ZF system. We study dependence of the generation on parameters of the system and show that this phenomenon is universal at high shear rates of ZF and should take place in tokamaks.


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