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On the role of mean flow in zonal flow generation in drift wave turbulence KEN UZAWA, JIQUAN LI, YASUAKI KISHIMOTO, Graduate School of Energy Science, Kyoto University — The coherent mean flow is an important ingredient to regulate turbulent transport in magnetic fusion plasmas. A minimal modeling for zonal flow instability with mean flow effects on 4-wave modulation process[1] was developed based on Hasegawa-Mima(HM) turbulence, in which direct interaction between the mean flow and pump waves was ignored for the simplicity, similar to the approximation in[2]. As an example, ETG turbulence was sampled as the pump waves and ITG driven zonal flow was assumed as the mean flow like a stationary standing wave. The minimal modeling analysis showed that the zonal flow generation is reduced by the mean flow through increasing the real frequency of zonal flow [3]. To justify the validity of the minimal modeling and evaluate the role of the mean flow, a spectral code to solve 2D HM equation with the mean flow effect is advanced to calculate the whole contribution of all possible nonlinear interaction to the zonal flow generation in the system with mean flow, zonal flows and pump waves as well as sidebands. It is found that the mean flow can only slightly reduce the zonal flow generation. The mean flow scatters the pump energy to a wider spectrum, which may in turn enhance the modulation response for the zonal flow excitation. [1] Li & Kishimoto, PoP 9, 1241(2002) [2] Kim & Diamond, PoP 10, 1698 (2003) [3] Uzawa et al. APS 2005, PFR 1, 024(2006)

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