

Nonlinear characteristics of mediator and streamer in linear magnetized plasmas

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In magnetized plasmas, drift waves are excited by inhomogeneity of the pressure gradient and can develop into nonlinear structures, such as zonal flow and streamer. The study of these nonlinearly evolved structures are important for nuclear fusion, since they affect radial transport and determine confinement. One of the cause of anomalous transport is due to the streamer, which is known as radially elongated and azimuthally localized structure. In a linear device, LMD-U in Kyushu University, streamer was found to be excited by the modulation of drift waves through low frequency fluctuations, namely mediator [1].

Up to date, the mediator has been simply treated as linear wave. However, by applying the conditional averaging, the mediator is found nonlinear wave that contains harmonic components excited from the self-couplings in the PANTA, the successor device of the LMD-U. Moreover, the envelope of the streamer also contains higher harmonic components of which frequencies are identical to that of the mediator. This indicates that the streamer should be modulated through higher harmonic components of the mediator as well as through fundamental components. Furthermore, it is also found, as is commonly observed for solitons, that the amplitude of the co-existing solitary structures, mediator and streamer, increase inversely with the square of the width of half maximum.

References

- [1] T. Yamada et al. *Nature Phys.* **4**, 721 (2008)