

Theory of turbulence driven intrinsic rotation and current

Thursday 25 October 2018 14:00 (20 minutes)

We present new results in the theory of turbulence driven intrinsic rotation and current. Both the intrinsic rotation and the intrinsic current driven by micro-turbulence are important for ITER. The former is critical for ITER due to its important role in suppressing MHD instabilities, since neutral beam injection may not provide enough external rotation drive in ITER. The latter is important because the non-inductive current drive is essential for steady state operation of tokamak reactor. This paper presents a novel mechanism for the origin of intrinsic rotation, which is referred as turbulent acceleration [1]. We emphasize that the turbulent acceleration does not contradict momentum conservation law [2]. The possible relevance of the turbulent acceleration to some experimental observations is also discussed [3, 4]. Inspired by the investigation of intrinsic rotation (which is related to ion momentum) driven by turbulence, we also present the intrinsic current (which is related to electron momentum) driven by turbulence [5].

[1] Lu Wang and P. H. Diamond, *Phys. Rev. Lett.* 110, 265006 (2013).

[2] Shuitao Peng and Lu Wang, *Phys. Plasmas* 24, 012304 (2017).

[3] Lu Wang, Shuitao Peng and P.H. Diamond, *Phys. Plasmas* 23 042309 (2016).

[4] Shuitao Peng, Lu Wang and Yuan Pan, *Nucl. Fusion* 57 036003 (2017).

[5] Wen He, Lu Wang*, Shuitao Peng, Weixin Guo, and Ge Zhuang, "Intrinsic current drive by electromagnetic electron temperature gradient turbulence in tokamak plasmas", to be submitted to NF.

Country or International Organization

China, People's Republic of

Paper Number

TH/P6-4

Author: Prof. WANG, Lu (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, State Key Laboratory of Advanced Electromagnetic Engineering and Technology, School of Electrical and Electronic Engineering, Huazhong University of Science and Technology)

Co-authors: Prof. DIAMOND, Patrick H. (NFRI, UCSD); Mr PENG, Shuitao (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, State Key Laboratory of Advanced Electromagnetic Engineering and Technology, School of Electrical and Electronic Engineering, Huazhong University of Science and Technology); Mr HE, Wen (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, State Key Laboratory of Advanced Electromagnetic Engineering and Technology, School of Electrical and Electronic Engineering, Huazhong University of Science and Technology)

Presenter: Prof. WANG, Lu (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, State Key Laboratory of Advanced Electromagnetic Engineering and Technology, School of Electrical and Electronic Engineering, Huazhong University of Science and Technology)

Session Classification: P6 Posters