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マルチレンズを用いた低アスペクト比RFPにおける可視光三次元構造の計測

Measurements of 3-D Structure of visible light in Low-Aspect-Ratio RFP RELAX with multi lenses

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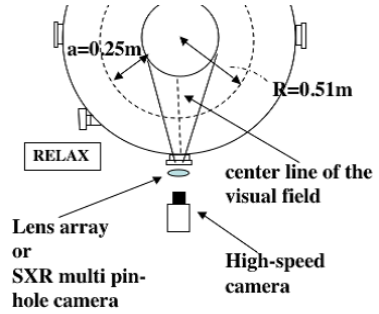
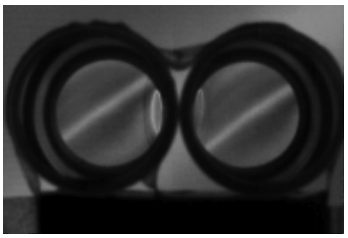
Three-dimensional (3-D) effects on MHD phenomena in axisymmetric systems such as reversed field pinches (RFPs) have attracted much attention. In the RFP, for example, recent progress has shown the importance of helically deformed RFP configuration where the single helical magnetic axis state is self-organized [1]. In a low-aspect-ratio (low-A) RFP machine RELAX (R = 0.51 m/a = 0.25 m (A = 2)) [2], a quasi-periodic transition to quasi-single helicity (QSH) state has been observed. We succeeded in identifying the characteristic helical SXR structures which suggest hot helical core in QSH state, using the SXR imaging diagnostic system [3,4]. A high-speed camera diagnostic has revealed simple helix structure in the visible light image [5]. If there is no limitation on observation positions, a 3-D tomographic reconstruction is a powerful method for obtaining 3-D information; however, the observation positions and their available numbers are considerably restricted in plasma experiment devices. It is required that a method for identification of 3-D structure from a single exposure image obtained from one viewing port.

In the present study, we are developing a 3-D recording system where multiple concave lenses and a high-speed camera for the study of time evolution of 3-D structure. As an initial experiment, we have taken vertical visible light images with time resolution of 10 μsec, to identify time evolution of filament-like single helix structure in RELAX plasmas. We will discuss these results to make clear experimental and theoretical requirements for 3-D structural studies.



Schematic of experimental setup



Filament structure obtained with dual concave lenses.

[1] R. Lorenzini *et al.*, Nature Physics, **5** 570 (2009)
[2] S. Masamune *et al.*, 24th IAEA Fusion Energy Conf., EX/P4-24 (2012)
[3] A. Sanpei *et al.*, IEEE on Transaction Plasma Science, **39** 2410 (2011)
[4] K. Nishimura *et al.*, Rev. Sci. Inst., **85** 033502 (2014)
[5] T. Onchi *et al.*, Plasma and Fusion Res., **3** 005 (2008)