Microwave Reflectometer

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1. Objective

Microwave reflectometers are measured a density fluctuation, an electron density profile, and a poloidal flow velocity.

2. Apparatus

2.1. Specification

Currently, five types of reflectometer systems are working as follows:

(1)Frequency comb Doppler reflectometer
frequency band : Ka-, U-band
objects : radial profile of density fluctuation, poloidal flow velocity
frequency response : 1MHz
spatial points : 16 points (fixed)

(2)Frequency hopping Doppler reflectometer
frequency band : Ka-, V-band
objects : radial profile of density fluctuation, poloidal flow velocity
frequency response : 1MHz
spatial points : typically 20points (variable)

(3) Ultra-short pulsed radar reflectometer
frequency band : X-, Ku-, Ka-, U-band
objects : radial profile of electron density
frequency response : 100kHz
spatial points : 40 points

(4) Frequency fixed E-band heterodyne reflectometer
frequency : 65, 68 GHz
objects : density fluctuation monitor
frequency response : 1MHz
spatial points : 2 points

(5) Frequency fixed Ka-band heterodyne reflectometer
frequency : 28, 30 GHz

objects : fast density fluctuation

frequency response : 2.5GHz

spatial points : 2 points

2.2. Arrangement of all reflectometers

(1) 3-O port (AD03) vertical direction

(2) 9-O port (AD01, AD03, AD04) horizontal direction

(3) 3-O port (AD02) vertical direction

(4) 3-O port (AD01) horizontal direction

(5) 3.5U port (BC03) vertical direction

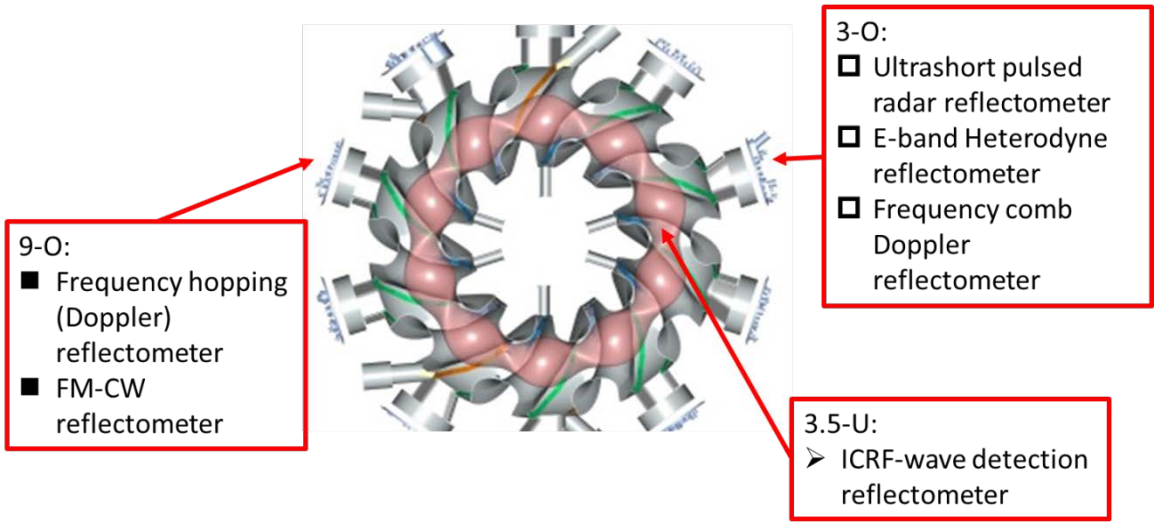

Fig. 1. Toroidal location of Reflectometers.

- Cross sections are shown in Figs.2 and 3.

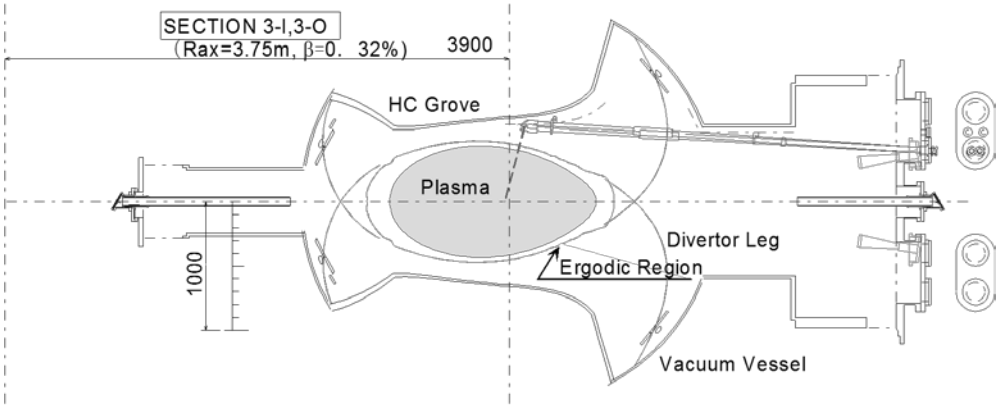

Fig. 2. 3-O port reflectoemter antenna arrangement

ultra-short pulsed radar reflectometer launches from high-field side.

fixed frequency reflectometer launches from low-filed side.

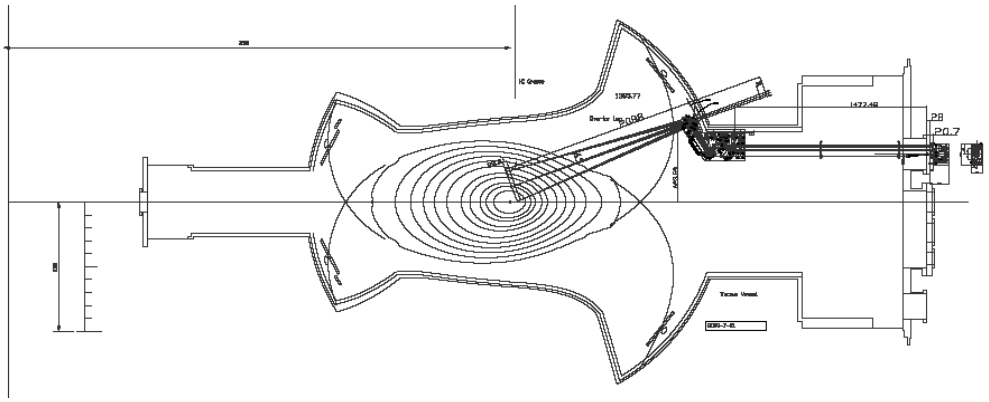

Fig. 3. 9-O port Doppler reflectometer

3. Operational requirement

- In the case of an X-mode operation, the available magnetic field strength is limitted.

4. Available data by “Retrieve”

4.1 Kaiseki-data server

-“mwrm_9o_R_Iamp”: Fluctuation amplitude measured by Ka-band Frequency hopping Doppler reflectometer at 9-O port

- “mwrm_9o_R_Iamp_fast”: High time resolution of above fluctuation amplitude measurement

-“mwrm_9o_R_Vp”: Poloidal velocity by 9-O Ka-band Frequency hopping Doppler reflectometer

- “mwrm_9o_R_Vp_fast”: High time resolution of above poloidal velocity measurement

-“mwrm_comb_R_Iamp”: Fluctuation amplitude measured by Ka-band Frequency comb Doppler reflectometer at 3-O port

- “mwrm_comb_R_Iamp_fast”: High time resolution of above fluctuation amplitude measurement

-“mwrm_comb_R_Vp”: Poloidal velocity by 3-O Frequency comb Doppler reflectometer

- “mwrm_comb_R_Vp_fast”: High time resolution of above poloidal velocity measurement

5. Remarks

References

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