

Fast scanning Langmuir probes

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1. Objective

Investigate 1 dimensional distribution of edge plasma parameters and their fluctuation characteristics

2. Apparatus

2.1. Fast scanning probe (FSP) with three probe tips

- scanning machine located at 4.5U port is driven by a compressed air cylinder
- FSP head is inserted from the top to the bottom with the insertion speed of ~ 1 m/s
- moving distance is 50 cm, which is monitored by the laser distance meter
- the FSP can reach the ergodic region
- three probe tips are positioned on a plane perpendicular to the magnetic field gradient around the divertor leg (see Fig. 1)
- three probe tips are made of graphite or CFC which has a dome shape with a radius of 1 mm
- this FSP head can evaluate the electric field inside blobs by using statistical techniques

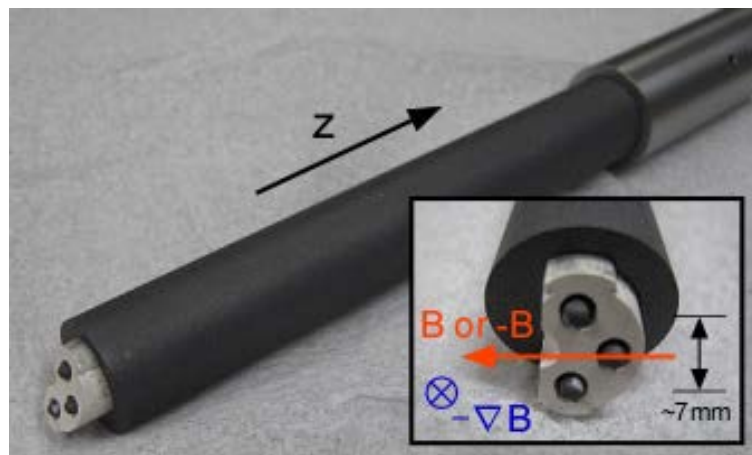


Fig. 1. FSP head with three probe tips.

2.2. FSP with the ion sensitive probe head

- scanning machine located at 4.5U port is driven by a compressed air cylinder
- FSP head is inserted from the top to the bottom with the insertion speed of ~ 1 m/s
- moving distance is 30 cm, which is monitored by the laser distance meter
- the FSP can only intersect the divertor leg
- there are ion corrector electrode and gird electrode with 0.5 mm distance along the probe shaft (see Fig. 2)
- probe tips are made of TZM



Fig. 2 FSP head with the ion sensitive probe.

3. Operation

3.1. Single probe characteristics mode

- single probe characteristics can be obtained by sweeping the applied voltage on the probe electrode
- electron density, electron temperature, floating potential, and space potential can be estimated
- ion temperature can be estimated by using the ion sensitive probe
- sweeping frequency is normally 250 Hz

3.2. fluctuation mode

- ion saturation current and/or floating potential fluctuations can be obtained
- sampling frequency is 100 kHz – 1 MHz

4. Available data by “Retrieve”

4.1. LABCOM

- diagnostic names are “Langmuir3”, “Langmuir6”, and “Langmuir7”

5. Remarks

The FSP is inserted during the low heating power discharge.

References

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