Effects of azimuthal cusp magnetic field on neutron production rate in a cylindrical inertial electrostatic confinement device

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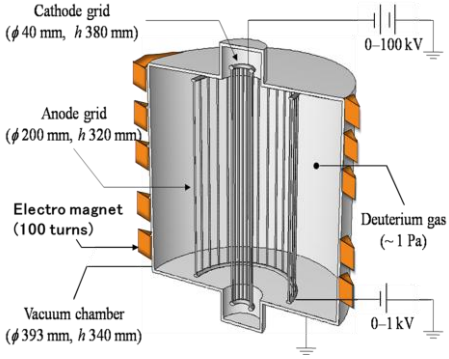
A cylindrical IEC device with azimuthal cusp magnetic field was developed. The cusp magnetic field enables electron confinement near the chamber wall, which leads to efficient ion production, acceleration and reduction of ion energy loss by charge exchange reaction under a low pressure condition. Furthermore the azimuthal cusp magnetic field is expected to reduce the loss of electrons more than axial cusp magnetic field [1], because electrons will move in the azimuthal direction by ***E*** x ***B*** drift motion.

The cusp magnetic field was generated by several circular electromagnets installed outside the chamber wall, and the magnetic flux density near the wall is around 10 mT. In order to study the effect of applying cusp magnetic field, the dependence of neutron production rate on magnetic flux density, cathode current and applied voltage was investigated and also the cathode temperature was measured by an infrared thermometer. The effects of azimuthal cusp magnetic field on neutron production rate and ion energy will be discussed in the meeting.



Schematic of cylindrical IEC device with azimuthal cusp magnetic field

Appearance of the device

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[1] Kunihiko Tomiyasu, Kai Yokoyama, Kunihito Yamauchi, Masato Watanabe, Akitoshi Okino, Eiki Hotta, Fusion Science and Technology, **56**, pp. 967-971 (2009).