

## Design and Fabrication of EAST New-type ICRF Antenna

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### Abstract

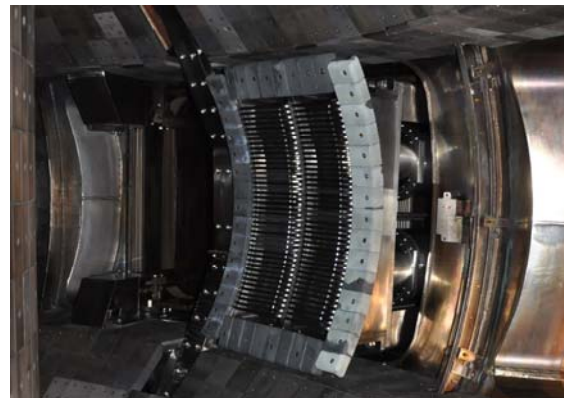
A single new-type two-strap Ion Cyclotron Resonance Frequency (ICRF) antenna has been designed and fabricated for the EAST device, with RF power of 1.5MW. In the frequency range between 30 to 110 MHz, the new-type antenna is intended to launch 1~1.5MW RF power to the plasma of EAST, and contribute to meet the aim of the EAST 2010 campaign: to operate at a plasma current 0.4~0.6 MA with a total heating power higher than 2.5 MW [1] [2].

To search for a better plasma heating method, a new theoretical model was carried out to design the new antenna. The new-type ICRF antenna consists of two straps, faraday shield, four 8 inch vacuum transmission lines (VTL), and vacuum feedthroughs. Due to the high operation parameter goal and effective RF coupling, irregular surfaces and elaborate active cooling path of the strap was designed according to the plasma shape and heat load. A new Faraday Shield was made up of cavity box, 84 cooling pipes and septum. The horizontal layout of 84 cooling pipes results in approximately 35% transparency and a parallel connection for reducing the flow resistance. High stand-off voltage and current ability being requested to realize the campaign goal, the 8 inch VTLs could enhance the RF power capacity of antenna [3]. Primary vacuum feedthroughs are used on the new ICRF antenna, while the new feedthrough is being developed. Motor-screw-guide system is used to realize the accurate displacement driving of the antenna.

As indicated, the antenna has been fabricated and assembled in Feb, 2010 and obtained a good matching and heating result in the first phase of EAST 2010 campaign. In the coming test, higher power will launch to the plasma.



*Figure 1: new-type antenna assembly*



*Figure 2: new-type antenna in vacuum vessel*

### Reference

- [1] EAST ICRF team, ICRF TF Mission Report for EAST 2010 1st campaign, internal report, 2010
- [2] X.Z.Gong, Operation plan for EAST 2010 1st campaign, internal report, 2010
- [3] Q.X. Yang et., Design of transmission line of ICRH antenna for EAST, Nuclear Fusion and Plasma Physics, Vol.28, 2008, 242-246