Improvement of ITER equatorial EC launcher design for poloidal steering compatibility


National Institute of Quantum and Radiological Science and Technology, *MHK Systems Co. Ltd., **ITER Organization

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**Iteration of the coil spring and bellows to balance the new spiral pipe.

- **Redesign of the coil spring and bellows to balance the new spiral pipe.**

**Successful design of steering mechanism.**

- **Original design is F4E for upper EC launcher (4 RF beams).**

**Larger mirror and high power RF absorption (RF beam input 4 → 8).**

- **Large diameter of Spiral cooling pipe.**

**Successful design of mirror unit flange.**

- **Solution**
- **Redesign of the coil spring and bellows to balance the new spiral pipe.**

**Improve design of Blanket Shield Module (BSM.)**

- **Issue**
- **Temperature gradient is too high.**
- **Difficulty of the nondestructive inspection.**

- **Solution**
- **Separate the first wall from neutron shielding module.**
- **Thermal stress decreased to half.**

**Improvement of the Electron Cyclotron Current Drive (ECCD) by introducing the ray-tracing code into optical design.**

- **Issue**
- **Optical design is aimed to concentrate the beam.**

- **Solution**
- **Integrate the ray-tracing code into the optimization code of the optical design.**

- **Width of ECCD profile is largely decreased.**