Development of Dual-frequency Gyrotron and Launcher for the JT-60SA ECH/ECCD System

Success of the dual-frequency gyrotron development (110/138 GHz, 1MW, 100s) for JT-60SA

New record as a dual-frequency gyrotron

Additional frequency of 82 GHz is also successful

- An oscillation at 82 GHz (0.3 MW, 20ms) was demonstrated by the same gyrotron
- A possibility of the use of fundamental harmonic waves (<1MW, <1s) in JT-60SA.

Optimized electron pitch factor available with a triode electron gun through the anode-cathode voltage ($V_{ak}$) control resulted in high-efficiency at both frequencies.

- New record of a dual-frequency gyrotron.
- The target for JT-60SA has been fully satisfied.
- High oscillation efficiency > 30% (without effect of energy recovery by collector potential depression).
- Low heat load was confirmed. It will enable 1.5 - 2 MW (for several seconds) oscillations.
- Launcher/polarizer were developed for dual-frequency operations of the ECH/ECCD system.