Maximizing MST’s Inductive Capability with Programmable BT and BP Power Supplies

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There are new strong motivations on MST for increased plasma current, increased pulse length, and flexible waveform control. Two recent improvements suggest that these requests can be met with power supplies in the future. The new power supply equipment is intended to provide MST with the most advanced inductive capability of several kHz at about 25 MW. The design of a similar but more advanced supply will be completed in 2024.

A power supply for BT is already in operation. Based on IGBT technology, there are now strong motivations on MST for increased plasma current, increased pulse length, and flexible waveform control. There are now strong motivations on MST for increased plasma current, increased pulse length, and flexible waveform control. There are now strong motivations on MST for increased plasma current, increased pulse length, and flexible waveform control.

Profile control has generated substantially improved confinement, allowing the plasma to remain in the plasma for a longer time than the duration of present MST discharges. Inductive current is generated by the oscillating current across the plasma. The oscillating field sets up a plasma current that is several-fold larger than temperatures achieved at 0.2 MA.

Lessons from BT supply
- PT demands more power than BT
- Better waveform control, longer experiment time gives better Oscillating Field Current Drive
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Possible BP Supply scheme
- Possible configurations: Four amplifiers each driving two taps
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Flexible BT and BP field control will benefit MST
- Longer discharges, better control
- More efficient use of BP transformer
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MST Reversed Field Pinch
- Plasma current: 4 T coli
- Discharge duration: 32 msec
- Highest T_0 = 2 keV
- The design of a similar but more advanced supply will be completed in 2024.

Programmable BT Supply: Installed, Working Well
- Supply is modular, expandable
- Can generate complex BT waveforms
- module has 4 IGbt’s
- Module output 1600 A at 900 V
- Can operate in series or parallel
- Single-turn voltage up to 250 V
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BT Transformer connection scheme upgraded
- Possible BP Supply scheme
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