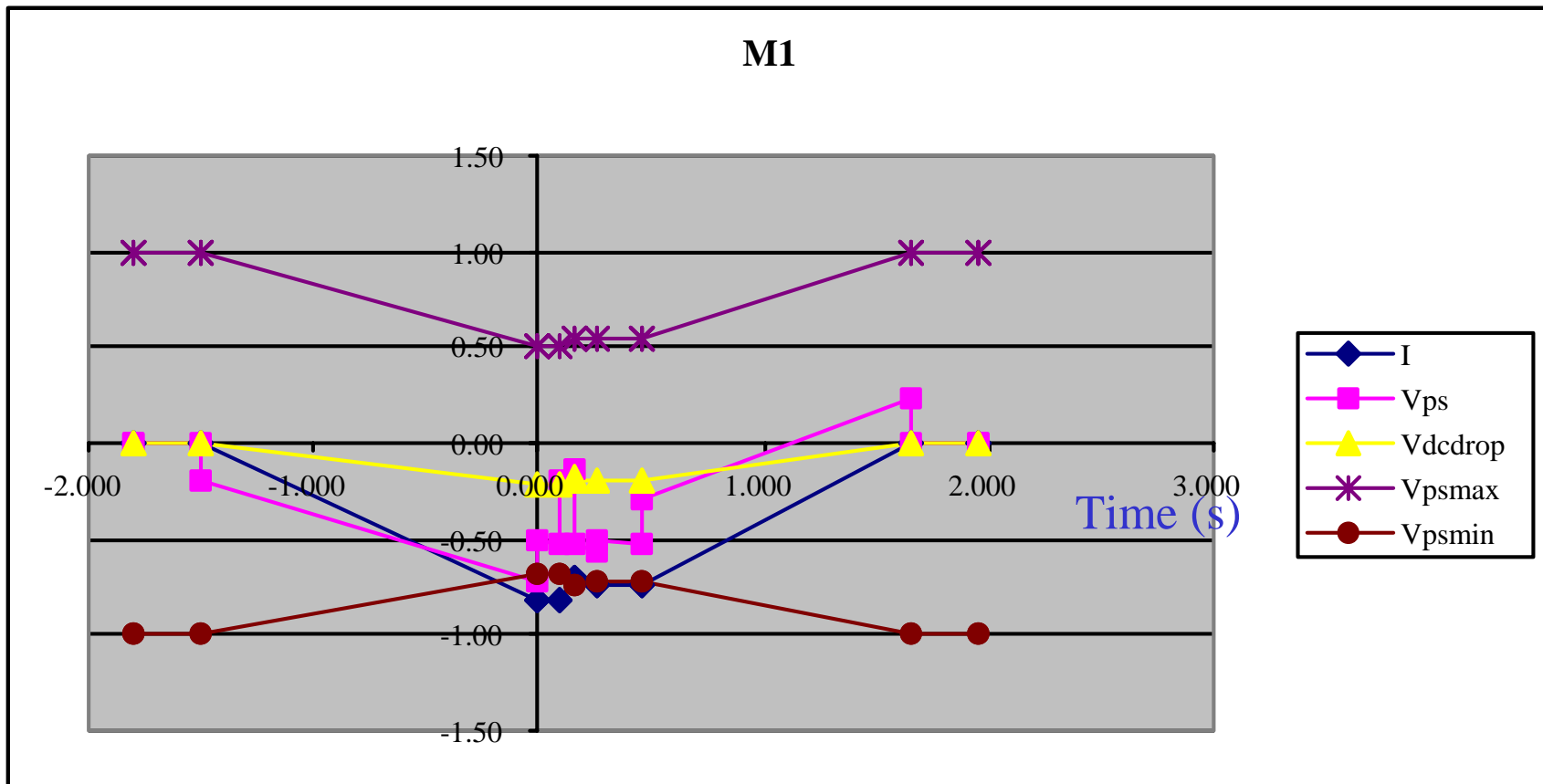


The Modular Coil Currents Presently Have Modulation During Flat-top



NCSX Power Supply Configurations for Modular, TF, and PF Coils

| NCSX Power Supply Configuration for Coils (Use D-Site TF2-PS for NCSXPF1&D-Dite TF1-PS for all others) | | | | | | | | | | | | | | | |
|--|-----------|------------------|-----------------------|-------------------|---------------|--------------------------------|-----------------------|-------------------|---------------|--------------------------------|-----------------------|-------------------|---------------|--------------------|----|
| Day 1, 1.2 Tesla: Perid : 300 seconds | | | | | | 1.2 Tesla: Perid : 900 seconds | | | | 1.7 Tesla: Period: 900 seconds | | | | | |
| Pwr. Sup. # | NCSX Coil | Reqd Coil Iin kA | Pulse Duration (ES W) | RMS Coil Iin amps | Site PSS reqd | Reqd. Coil Iin kA | Pulse Duration (ES W) | RMS Coil Iin amps | Site PSS reqd | Reqd. Coil Iin kA | Pulse Duration (ES W) | RMS Coil Iin AMPS | Site PSS reqd | Basis MAX RMS Coil | |
| 1 | M1 | 10.35 | 1.32 | 687 | 2 | 10.34 | 2.37 | 531 | 2 | 20.7 | 1.36 | 805 | 2 | 805 | |
| 2 | M2 | 9.7 | 1.39 | 660 | 2 | 9.68 | 2.55 | 515 | 2 | 19.4 | 1.43 | 773 | 2 | 773 | |
| 3 | M3 | 10.01 | 1.4 | 684 | 2 | 10.01 | 2.57 | 535 | 2 | 20 | 1.44 | 800 | 2 | 800 | |
| 4 | M4 | 10.6 | 1.28 | 692 | 2 | 10.58 | 2.26 | 530 | 2 | 21.2 | 1.32 | 812 | 2 | 812 | |
| 5 | PF1 | 22.4 | 0.79 | 1149 | 12 | 21.5 | 1.81 | 964 | 12 | 17.1 | 0.99 | 567 | 12 | 1149 | |
| 6 | PF2 | 22.4 | 1.31 | 1480 | 4 | 21.5 | 2.16 | 1053 | 4 | 23.9 | 1.05 | 816 | 4 | 1480 | |
| 7 | PF3 | 15.31 | 1.23 | 980 | 2 | 13.57 | 2.02 | 643 | 2 | 23.9 | 1.13 | 847 | 2 | 980 | |
| 8 | PF4 | 6.9 | 0.93 | 384 | 2 | 7.09 | 1.94 | 329 | 2 | 21.6 | 0.86 | 668 | 2 | 668 | |
| 9 | PF5 | 6.95 | 0.88 | 376 | 2 | 7.14 | 0.94 | 231 | 2 | 9.4 | 0.93 | 302 | 2 | 376 | |
| 10 | TF | 8.7 | 0.86 | 466 | 4 | 8.7 | 0.95 | 283 | 4 | 4.9 | 0.87 | 152 | 4 | 466 | |
| | | | | | 34 | | | | | 34 | | | | | 34 |
| Note: Trim Coils are fed from C-Site Robicon Power supplies. | | | | | | | | | | | | | | | |

Maximum Power Supply Ramp Rate

| | M1 | M2 | M3 | M4 |
|-----------------------------|-------------|--|--------|--------|
| M1 | 0.0216 | 0.0058 | 0.0032 | 0.0015 |
| M2 | 0.0058 | 0.0181 | 0.0056 | 0.0023 |
| M3 | 0.0032 | 0.0056 | 0.0232 | 0.0066 |
| M4 | 0.0015 | 0.0023 | 0.0066 | 0.0134 |
| I-max | 10.60 | kA(1.2 T mode) | | |
| Vmax (4 in series) | 8.00 | kV | | |
| Series inductance | 0.13 | Henry | | |
| Max. dI/dT | 63.34 | kA/s | | |
| Time to reach I-max: | 0.17 | s, which is ~10 times normal ramp rate. | | |

Estimates indicate active modulation may be possible

- Vacuum vessel toroidal time constant: ~ 10 ms
- Vacuum vessel poloidal time constant: ~ 2 ms.
- Ramp time for modular coil current at max. power supply voltage (1.2 T scenario): ~ 170 ms.
- Since the ramp time is 85 times longer than the poloidal time constant of the vessel, field penetration will be good.
- Tentative conclusion: if active power supply control was added, we could provide a reasonable level of active modulation.
 - SPARK eddy current analyses still have to be performed to determine the level and effects of induced currents.
 - This may result in a ramp rate limit.