Magnetic Compression Experiment at General Fusion
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INTRODUCTION

General Fusion is developing an advanced magnetic compression (M Caito) power plant, in which implosion of a liquid lithium shell by the action of pistons external to the shell will compact a torus blank (to fusion conditions). The SMRT magnetic compression experiment described in this poster was designed as a repetitive, non-destructive test to study plasma physics applicable to this compression approach.

Each coil has a separate identical circuit. Unlike the crowbarred levitation currents, the compression currents are allowed to flow with the capacitor discharge. Peak CT compression is achieved at the peak of the first half-period. Levitation and compression current profiles can be seen in figures 8, 10, & 11.

- Levitated CT lifetime increased by ~50% with a longer coil (e.g. 11 coil vs 6)
- Plasma impurities were a major problem with the original design (8 coils), especially with the quartz wall.
- Matching decay rates of levitation current & CT toroidal current led to increased good shot repeatability, and 20-30 MHD activity, and ~10% lifetime increase.
- B, rises by a factor of up to 5 (13/12 millisecond) on the 2300 MHz profile, and density increases up to 7.
- Compression efficiency improved greatly with the long coil.
- Compressional asymmetry requires further study. Asymmetric CT current distribution is associated with compressional MHD activity [1].

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Figure 2: Machine headpost schematic indicating main 80kA & 120kV getting ports.

REFERENCES


