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**Magnetic Field Generation in the Madison Dynamo Experiment**

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The Madison dynamo experiment is designed to self-generate magnetic fields from flows of conducting metal in a simply connected spherical geometry. Thus far, the experiment has been operated at ∼60% of its design speed (1/3 of its maximum power) achieving a Magnetic Reynolds numbers (based on propellor tip speed) of 130 (comparable to the core of the Earth). The technical operation of the experiment (transfers of liquid sodium, rotating seals, etc) has been demonstrated. The experimental approach to understanding the electromagnetic properties of the flowing sodium involves comparisons between experimental measurements of the magnetic field in the sodium experiment, measurements of the velocity field in a dimensionally identical water experiment, and predictive MHD codes that model the currents induced in the turbulent flows by externally applied fields. Self-excitation has not yet been observed, rather experiments have been performed using externally applied magnetic fields. Initial experimental results include: direct observation of the production of a toroidal (an east-west component inside the sphere) magnetic field from a dipolar magnetic field; the expulsion of an applied magnetic field by vortical fluid motion; generation of a dipole magnetic field by a mean-field EMF; measurement of the turbulent shredding of a large scale magnetic field by small scale turbulence in the velocity field; and intermittent self-excitation of the dynamo eigenmode. Future plans will be discussed, including the strategy for observing self-excitation.