

Experimental Bullard–von Karman dynamo: MHD saturated regimes
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The Bullard–von Karman dynamo is a semi–synthetic dynamo where one fluid and fully turbulent magnetic induction process is externally amplified to drive currents in external coils. The fluid flow is of the von–Karman type, where the flow is driven by the counter–rotation of two impellers in a cylinder filled with liquid gallium. This experimental setup allows for setting the dynamo instability threshold through the external amplification and to observe dynamo instability well below the natural threshold. We present here a configuration where the amplitude of the magnetic field is such that the Lorentz–force saturation is observed. The Bullard–von Karman dynamo thus involves a full MHD saturated state, contrary to the VKS experiment for which no evidence of the saturation has been observed. We present a detailed analysis of the dynamo, which develops through an on/off intermittent regime. Saturated regimes well above threshold are characterized. Erratic polarity inversions are also observed. Finally, we introduce a subcritical dynamo regime.