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Complementary Experiments at the Karlsruhe Dynamo Test Facility

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The Karlsruhe Dynamo Experiments have demonstrated that a permanent magnetic field of dipole character can be generated by a proper arrangement of helical vortices in a container filled with liquid sodium employing forced flow in helical guide tubes. Moreover, it has been shown that the dynamo state originates from the hydrodynamic turbulent state of channel flow as an imperfect bifurcation. In a recent series of experiments the critical conditions for dynamo action as well as the supercritical dynamo behaviour were investigated with regard to a) variations of the electrical conductivity of the test fluid sodium (by varying the sodium temperature), b) time periodic variations of the volumetric flow rates at a period comparable with the magnetic diffusion time of the test module, c) the feedback of the dynamo field on the velocity in the guide channels of the module with the help of permanent magnet potential probes. The results and conclusions from these experiments may be presentet at the 21st ICTAM, 2004 WARSAW

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