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Simulation of Power Supply for Vertical Stabilization of Plasmas at ITER MAXIMILIAN SWIATLOWSKI, Harvard University, CHARLES NEUMEYER, Princeton Plasma Physics Lab — We present the results of simulations of the power supply of an ITER vertical stabilization magnet system. ITER's elongated tokamak geometry enables increased plasma pressures at the cost of the loss of vertical stability, as the vertical-horizontal asymmetry allows small vertical perturbations to grow to dangerous levels. The ITER design calls for three independent magnetic systems to control this unstable growth; we describe the VS3 system which uses a set of in-vessel coils to actively generate a magnetic response when drift is detected. The primary requirements of the power- supply are to provide 80 kA for 0.3 s pulses every 10 s, while maintaining 20 kA during 1 s events every 2 s and 10 kA otherwise. An IGCT chopper design with variable pulse-width-modulation frequency is chosen to minimize cost and thermal losses. A full model of the circuit is developed in the time-domain simulation program PSCAD, and the design is demonstrated to be capable of delivering the specified signals. A thermal model is created to determine the optimal number of chopper bridges; a 4-wire plasma model is written to ensure the magnet's stabilization properties. We conclude that an IGCT chopper power supply is an effective system to drive the current of the VS3 in-vessel stabilization magnets at ITER.

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