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Theory Experiment

EAST First Diverted Plasma Operations – Plasma Control and Vertical Stabilization,* A.W. Hyatt, J.A. Leuer, D.A. Humphreys, G.L. Jackson, R.D. Johnson, B.G. Penaflor, D.A. Piglowski, M.L. Walker, A.S. Welander, GA, D. Mueller, PPPL, B.J. Xiao, Q.P. Yuan, H.Z. Wang, P. Fu, X. Gong, J. Luo, Y. Wan, J. Li, EAST Team, ASIPP – EAST, the first operational fully superconducting tokamak, has a poloidal field (PF) coil set that is similar to ITER. The EAST digital plasma control system (PCS), based on the DIII-D PCS, allowed EAST to rapidly progress from first plasma to diverted operations in a few months, and GA personnel to remotely support the initial rollout of the PCS. Effective combined I_p , R_p , and Z_p control with a fully independent PF coil set has been demonstrated. Careful current programming of the PF coils demonstrated stable diverted plasma operation. AC heating and breakdown concerns limited the PF coils' power supplies' bandwidth, voltage, and ability to counter the growth of $n=0$ instabilities when the plasma elongation $kappa$, $kappa \geq 1.15$. Auxiliary internal PF coils driven by a fast power supply (3 kHz, 5 kA, 600 V), provided effective vertical stabilization at $kappa \geq 1.8$. Examples and simulations will be shown.

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