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Controlling ITER Scenarios J.A. SNIPES, D.J. CAMPBELL, T. CASPER, Y. GRIBOV, S.-H. KIM, A. WINTER, ITER Organization — The three principal ITER operational scenarios are the 15 MA, 5.3 T, Q=10 inductive scenario, the 1000 s, 10.5-13.5 MA, 5.3 T, Q>5 Hybrid scenario, and the 3000 s, 7.5-10 MA, 5.3 T, Q∼5 steady-state scenario. Extensive modeling of the inductive scenario indicates that the ITER baseline actuators should be capable of all of the required basic control and that the ITER diagnostic specifications should provide adequate measurements with which to carry out such control. Current ramp-up times as short as 50 s and ramp-down times as low as 60 s are within control limits. Expected plasma disturbances can also be controlled. More advanced control is required for the hybrid and steady-state scenarios. Depending on transport assumptions, some modeling indicates that the baseline actuators should also be capable of achieving the ITER performance goals in the hybrid scenario with modest confinement improvement (H98∼1.2). For steady-state scenarios, it is likely that substantial upgrades to the heating and current drive systems will be required to achieve the high performance and pulse length goals. High confinement (H98≤1.7) is also required to achieve these performance goals, challenging stability limits and requiring simultaneous control of multiple instabilities (e.g., ELMs, NTMs, RWMs) with limited shared actuators. The ITER Plasma Control System is being developed taking into account these challenging control requirements.

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