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H-mode Power Threshold, ELM Characteristics and Control, and Plasma Startup in Helium Plasmas in DIII-D[1] P. GOHIL, General Atomics, AND THE DIII-D HELIUM PLASMA TEAM — Determining the physics of helium plasmas and comparing with hydrogen and deuterium plasmas is important for the validation of key issues in plasma physics. This is also important for the first operational phase of ITER, which will use helium or hydrogen plasmas. Physcs issues for helium plasmas include: (a) the H-mode power threshold and the H-mode pedestal and ELM characteristics; (b) ELM suppression by resonant magnetic perturbations; (c) requirements for ITER plasma start-up and ramp-down. There is also the question of whether recent results from deuterium and hydrogen plasmas hold for helium plasmas. For example, recent studies of the H-mode power threshold in hydrogen and deuterium indicate that the power required to induce the L-H transition is dependent on the applied beam torque, and the H-mode power threshold using ECH (or a combination of ECH+NBI) is 20%-40% lower than that for discharges using NBI alone. Results from experiments to investigate issues (a) to (c) above in helium plasmas will be presented.

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