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Control of Internal Transport Barriers in the Fusion Burning Plasmas by using External Actuators. (PhD Oral-24) SOMA PANTA, DAVID NEWMAN, University of Alaska Fairbanks, PAUL TERRY, University of Wisconsin, Madison, RAUL SANCHEZ, Universidad Carlos III de Madrid, SPAIN — Steady state fusion reactor design free from large scale instabilities is one of the main goals in the fusion research community. In magnetically confined fusion devices, transport barriers formation can be characterized by the local reduction of the heat and particle diffusivities. Transport barriers help to make the plasma core hot and dense enough to get fusion power. Removal of these barriers allows profile relaxation through the enhancement of turbulence. E X B shear suppression of the turbulence plays the major role in formation of the internal transport barriers. Control of internal transport barriers in the ITER parameter scenarios is studied. External actuators like NBI power, RF power and Pellets are used to control the profile and the barrier. We used a one dimensional five field transport model for this research. We explored the use of a combination of RF heating and pellet injection to control the local gradients and therefore the growth rates and shearing rates for barrier initiation and control in self heated plasmas. Self-heating is found to reduce the amount of external power necessary for the steep profile formation as compared to the case without it. Using RF heating on both electron and ion channels at proper locations, electron channel barriers along with ion channel barriers can be formed and removed demonstrating a control technique. Likewise pellets can also be one of the controlling knobs for those barriers.

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