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Plasma performance required for fusion power control of tokamak power plant RYOJI HIWATARI, KUNIHIKO OKANO, Central Research Institute of Electric Power Industry — A control of fusion power is a basic function of the fusion power plant. There are several options to control the fusion power; the plasma density control, tritium ratio control, helium ratio control, and plasma current control. To assess those control methods, analysis on MHD stability and current drive is carried out by EQLAUS/ERATO, and DRIVER codes using design parameters of a conceptual tokamak DEMO design, Demo-CREST. First of all, density control can directly control the fusion power, but applicability of this method is found to be limited by compatibility with divertor plasma, where the high density is preferable for the detachment condition. Tritium ratio control is also found to be a candidate to control widely the fusion power maintaining the high density for the divertor detachment. However, this control method requires the high confinement improvement about HH=1.5. Helium ratio control is possibly one of the candidates. Wide range control of fusion power is confirmed concerning MHD stability and current drive property for Demo-CREST, but it is not easy to control helium density/transport, especially active exhaust of helium. Plasma current control is also investigated. Finally, plasma performance required for the fusion power control is discussed.

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