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The Protection Strategy Design and Implementation for ITER PF Converter System

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The International Thermonuclear Experimental Reactor (ITER) Poloidal Field (PF) power supply has 14 thyristor based ac/dc converter units to feed six PF coils. PF1 and PF6 coils are both fed by one four-quadrant converter unit respectively, while the PF2-PF5 coils are supplied power by three four-quadrant converter units connecting in series and under sequential control to reduce reactive power for each. The rated parameters for each converter unit is ± 55 kA and ± 1.05 kV. On account of the complex operation modes and the huge power of converter unit, any fault in converter might lead to escalation of fault and then damage the equipments in case of improper protective action or out of protection. Consequently, the protection strategy is definitely an indispensable and important part for ac/dc converter system. In this paper, the protection strategy is carefully designed based on the fault analysis including the current unbalance between two sharing current bridges, circulation current out of control, bridge and DC terminal over current, and other internal fault, etc. The ITER PF ac/dc converter has been manufactured and its control system prototype has been finished. All protection strategies have been experimented and effectively verified on ITER PF ac/dc converter in Institute of Plasma Physics, Chinese Academy of Sciences (ASIPP).

Eligible for student paper award?

No

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