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Conceptual Design of a Bidirectional Hybrid DC Circuit Breaker for Quench Protection of CFETR

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The conceptual design of quench protection circuit for CFETR (China Fusion Engineering Testing Reactor) rated for current up to 70 kA and voltage of 15 kV is presented. The proposed scheme is based on a mechanical switch paralleled to the controlled static breaker. Static breaker is composed of a IGBTs unit and four diode units in a rectifier bridge allows it to be used in both current directions. The feasibility of bidirectional static breaker such as the reliable turn-on IGBTs unit, voltage and current sharing of each IGBTs and effect of rectifier diode recovery characteristic are also investigated for conceptual design of quench protection. The voltage and current unbalance are discussed in detail by simulation analysis which includes the influence of the gate signal delay and stray inductance in each IGBTs branch. Finally, a discussion of the conceptual design of quench protection circuit is given.

Eligible for student paper award?

No

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