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CONTROLLED PULSED INJECTION FOR HV GAS BLAST CIRCUIT BREAKERS

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According to modern trends, the interrupting performance and reliability of modern HV gas blast circuit breakers (CB) should be increased. It becomes increasingly important with transition to SF6-free technologies [1]. The basic aim of the investigation is to improve the efficiency of arc quenching by increasing of interruption ability in CB with the same rated pressure and without drive parameter changing. Some disadvantages of the controlled switching [2] for modern CB are discussed.

A method of a short time gas pulse under high pressure - synchronous gas injection - is proposed in the study. It is developed with benefits and drawbacks of the controlled switching in mind. The synchronous gas injection should be introduced to the plasma region before current zero to reduce pre-zero arc conductivity, change the initial gas-dynamics characteristics (density, pressure, velocity, and mass flow rate), deform the arc thermal boundary layer, provide the turbulent mixing in the upstream region [3], and by doing so achieve necessary cooling-heating balance for successful arc extinguishing.

Performance of the suggested approach is investigated by numerical simulation and empirical relationships with a model arc quenching device. Air is conditionally taken as a gas medium. The research confirms the synchronous gas injection has a perspective to increase breaking capacity of circuit breakers in high voltage levels considering the limited power of the drives. Gas injection parameters in the vicinity of current zero are determined. Efficiency of the synchronous gas injection on the CB interruption ability is presented.

REFERENCES

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