INFLUENCE OF THE DOWNSTREAM REGION TO THE INTERRUPTION ABILITY OF THE HV GAS-BLAST INTERRUPTERS

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One of the main directions of the HV gas-blast interrupters (GBI) modernization is to increase the rated voltage and rated current per one break. The SF6 is widely used in the modern GBI for 50-63 kA, 330-500 kV and higher with additional shunt capacitance for today, that’s why the research of the SF6 effective use is very important.

It is known the downstream area has a significant effect on the auto-puffer with (or without) heating volume GBI interruption ability with an increase of the rated voltage [1, 2]. The pressure ration in such type of GBI is not much more than the critical pressure ratio. With an increase the rated voltage and interruption current the length between contacts increases. The insulation nozzle diameter increases too due to the intense nozzle wall ablation [1, 3]. These factors lead to the mass flow rate fall dawn, that is affected on the GBI interruption ability.

An additional mass flow rate from the wall at the nozzle throat is one of the possible ways to solve the problem [4]. This additional flow is directed into the downstream area. It is known that the temperature along the arc axis decreases non-uniformly, and its lowest value corresponds to the region of the nozzle throat and the adjacent diffuser region [2, 3]. If the length between contact increases, the GBI interruption ability decreases due to the pressure gradient reduction, attenuation turbulence effect, shock wave near the nozzle outlet and other effects in the downstream area. Mass flow rate of SF6 through the additional channel between the nozzle throat and compression volume can lead to a change of the flow distribution in the diffuser and some increase in the area with the non-conductive gas, which is necessary for success arc decay. By changing the angle of attack of the flow from the channel inlet, the flow parameters are selected to achieve the best results.

Numerical simulation is used to estimate the influence of the attack angle on the GBI interruption ability. Some calculation results are presented.

In the paper the effect of the additional SF6 mass flow rate to the downstream area of the insulation nozzle and its influence on the GBI interruption ability are discussed.

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REFERENCES