

Evaluation of the effect of a phase-shifting transformer with high-speed switching on the transient stability limit.

Brilinskii A. S., Gerasimov A. S., Smolovik S. V., Chudny V. S.

The article is devoted to assessing the influence of a phase-shifting transformer (FST) on the transient stability of power transmission, achieved by automatic phase angle control during the transition process due to high-speed switching. The estimation is based on the calculation of the transient stability limit at the first angle swing in the simplest scheme of an electric power system (power plant – power transmission line – infinite bus). An original method of FST accounting in the calculations of transients has been developed. The laws of FST control have been defined to ensure the stability limit increases. The objects of the study are a 160 MW turbogenerator and two hydrogenerators: a powerful hydrogenerator of classical design and a bulb-type hydrogenerator with extremely unfavorable electromechanical parameters (increased inductance, reduced mechanical inertia constant). The use of high-speed FST allows increasing the stability limit by 10–40 %, depending on the generator parameters.

Key words: dynamic stability, stability limit, phase-shifting transformer.