

On a vector control system for operating ac-grids within high penetration of renewables.

Dvorkin D. V., Novikov A. N., Novikov N. L., Suprunov I. S.

In electric power systems may occur power flows from existing power plants to large load nodes. The flows depend on grids' parts modes, in some cases, existing connections do not have sufficient capacity, considering the need to ensure the issuance of power from both traditional stations and renewable sources.

Power capacity limitations, in its term, may pent up the output of active power from power plants and decrease the reliability of the grid. In some cases, these capacity limitations are caused by current load limits under uneven power load in elements of different nominal voltages. To ease overloaded elements a vector control system can be applied.

Specifically, this task can be realized with flexible AC grids, as such a system of two desynchronized-doubly-fed synchronous machines (DDFS) with a transformer (autotransformer). Together, they can significantly increase the transfer capacity of a transmission system.

This article describes the operational characteristics of a hybrid system with DDSF machines and assesses its influence on electrical regimes and active power flow. In this paper, we present the effectiveness of DDFS to increase the transfer capacity. As an example, a part of the southern energy system of Russia is used.

Key words: vector control, desynchronized synchronous machine, transfer capacity increase, active power flow, renewables.