



DEVELOPMENT OF THE MODEL FOR SMALL SCALE ASYNCHRONOUS GENERATOR CONNECTION IMPACT ASSESSMENT ON DISTRIBUTION NETWORK

A. Lvoys, A. Obushevs, A. Mutule

*Institute of Physical Energetic
Aizkraukles str. 21, LV-1006 Riga – Latvia*

ABSTRACT

It is expected that the production of electrical energy from renewable energy sources and liberalized market further development can cause changes in the distribution network operating modes, as with time more small scale power plants will operate in liberalized market rather than ones with subsidies. Such situation can cause more frequent starts and stops of power plants comparing to current situation. To assess the impact of asynchronous generator connection to the existing network, taking into account technical limitations, there was created small scale HPP electric model, which simulates asynchronous machine transition processes.

In paper there are proposed the original basic principles of HPP working conditions. Mathematical model of small scale HPP was developed for simulation of HPP electricity production. The developed model consists of generator and network parts and is capable of modelling various generation and load interaction scenarios. Different generation and load scenarios have been modelled to evaluate generator connection impact on the existing network, taking into account technical constraints.

Load – generating interaction scenario modelling was implemented in Matlab environment. Power flow model was tested in Power World environment in order to verify the accuracy of its operation. Network and HPP simulations were carried out using the widely accepted IEEE 37 node test feeder.

Paper also includes description and results of case study performed to test proposed mathematical model. The elaborated model can be used for representing wide range of HPPs in assessment analysis of distribution network, as well as adapted for modelling of other types of power plants that use asynchronous generators.

Keywords: Hydroelectric power generation, mathematical model, power distribution