

Developing Program Security3 for Contingency Analysis Using Bus Impedance Matrix Z_{bus} Method¹

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Abstract

When a line is switched on or off through the action of circuit breaker, line currents are redistributed throughout the network and bus voltages change. The new steady-state bus voltages and line currents can be predicted by what is called the contingency analysis program. The large scale calculations do not have to be exact because the system planners and operators are more concerned about knowing if overload levels of current and out-of-limit voltages exist than finding the exact value quantities. On this account, approximations are made. Often resistance is considered negligible and the network model becomes purely reactive. Line charging and off-nominal tap-changing of transformers are also frequently omitted. In many cases, linear models are considered satisfactory and the principle of superposition is then employed. Methods of contingency analysis which use the system Z_{bus} , become attractive from the computational viewpoint, in addition to the possibility of using it for studying and analysing a lot of power system problems such as fault calculations and that its programmable method.

In our research we design an algorithm and develop a program called Security3 for electric power system contingency analysis using bus impedance matrix Z_{bus} . We apply it for reference power system and for Syrian network. We use a program called Power World through a Link with Security3 for load flow simulation for reference power system.

¹ For the paper in Arabic see pages (267-296).

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