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"Seleção Automática de Contingências e Análise da Segurança Estática de Sistemas de Potência Via Redes Neurais"

In modern energy management systems real-time power system monitoring is essencial to guarantee continuous electrical energy supply as well as power quality. Load demand has to be power quality supply. If constraints are violated, damages may caused to power cosumers and system components. Among these constraints are voltage limits and power transfer limits. During real-time power system monitoring it is assumed that system operating state is well known. This is possible through the execution of the state estimation function. Besides, it is also desirable that the effects of certain contingencies in system operation are also known. Such effects area handled by security analysis functions. The analvsis of post-contingency scenarios involves the solution of several power flow problems, which can be extremely burdensome depending on system size and the number of contingencies being considered. The methods proposed in the literature for automatically reducing the number of contingencies to be analyzed adopt simplified models that may lead to diagnosis errors.

This dissertation presents a method for automatic contingency selection and security evaluation of electrical power systems. The method uses multi-layer Perceptron neural networks whose inputs are power flows and injections, while the outputs identify potentially harmful contingencies. The neural networks outputs can also be used to classify system operating state with respect to static security and to compute severity indexes. The performance of the method is evaluated for different operating conditions using the IEEE 24 bus test system.