Paper 07: Investigations about self-excitation for large induction motor

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Abstract:

In polypropylene petrochemical plants large power induction motors (e.g. rated 9 to 20 MW), fed by a dedicated unit transformer, are normally used to drive extruder machines required by this type of industrial process. Most of the times the requirements from distribution grid operator about power factor improvement are quite demanding such as it becomes necessary to feed also capacitor banks from the same switchgear which supplies the motor. In case of a sudden opening of the switchgear incomer circuit breaker due to an inadvertent wrong operation procedure by plant personnel, it could happen that the motor remains temporarily connected to the capacitor during the coasting down transient of the motor: the phenomenon of motor self-excitation due to ferro-resonance between the magnetizing inductance of the motor and the bank capacitance can occur with the consequent damage and failure of the capacitor bank insulation. EMT software simulations are carried out to understand under which operating conditions the phenomenon of self-excitation of the induction motor can happen when the power factor compensation exceeds the magnetizing current of the motor.