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About disturbances in power systems at the transients due to switching operations of cable dynamics

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Abstract

The study presents the main **disturbances,** generated by the transitory phenomena at the commutation of cable dynamics. The same are presented **electromagnetic stresses modelling** features at the commutation of cable dynamics as part of the National Electical Energetic System. Switching of cables capacitive current is a normal duty for many medium and high voltage circuit breakers and switches. Switching of cable dynamics is characterised during connecting and reenergize of electric arc by the powerful current shocks, which produces dynamic, thermal stresses and electrical wear extremely pernicious for the commutation equipment for the cable themselves and for electrical network, thus possible serious **disturbances in the Power Systems** may occur.

At the disconnection of cable dynamics but more especially at the disconnection of the power transmission requested high capacity and long distances may appear an important **commutation overvoltage**, which in certain occasions may become **very dangerous for the apparatus, network assembly and sometimes even for the environment.**

Especially at the transients due to **switching operations of** cable dynamics, besides the transition current shock, the commutating overvoltages at disconnecting are creating **important values (not to be neglected) of magnetic and electric fields**, which trough their amplitudes, but especially the rapid variation in time are leading directly to important stress, some times with destructive effects with unfavourable and undesirable **effects for the Power Systems.**

These phenomena are theoretically analysed and practically illustrated by this study. Thus, electrical stress, electromagnetical stress and electrical wear of the contacts during connecting and disconnecting are determined. On these line the peak values the overcurrent during connecting of cable dynamics, and to electric arc recovery in the case of the power transmission requested high capacity and long distances.

Cable switching is graduated analysed: absence of the electric arc recovery and current pull up; with electric arc recovery but without current pull up ; without electric arc recovery but with current pull up and in the end with electric arc recovery and with current pull up.

This analysing is permanently considered from the point of view of the interaction between the electrical equipment and the network with the major effects in area of electric field intensity and magnetic field intensity.

This stress evaluation are based on **adequate numerical programs** concerning certain **equipment and cable dynamics operations** as part of **the Power Systems.**

The final part of this study contains proposals and recommendations for construction, function, operation of the assembly cable dynamics-network, to limit the level of stress and to rise the security in function.