

**B9.4****Electrical transient conditions of buried cable systems**

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The installation of buried links in urban environment often imposes the laying of power cables near either telecommunication or other power cables. This neighbourhood can involve great disturbances in the links, owing to the coupling inductive, existing between the different connections, more particularly due to single or three-phases defects in the power cables or in case of lightning impulse.

The usual formulas to value induced voltage in the next cables especially given in several publications are only valid for harmonic conditions. The softwares dedicated to the electromagnetic transient calculation are either dedicated to network simulation, such as EMTP, so of a very complicated use, or based on the finite elements method, that leads to prohibitory calculation time.

A model of cable has been developed from the Maxwell equations taken from different theoretic works. This model permits to calculate the induced voltages and currents in the links involving any number of conductors. It enables to estimate the influence of a cable on its neighbours, when it carries nominal current, a short circuit current, or when under a lightning impulse occurrence.

Furthermore, this model permits to precise the potential increase of shields under permanent or transient conditions, and then also permits to determine, according to the overvoltage limiting devices used, the elementary sections and therefore the number of joints, which is an important element for the cost analysis of a cable system.