

**B9.6****Switching overvoltages in complex networks**

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The overvoltages which occur when closing and reclosing unloaded lines are found to be significant for the transmission lines insulation coordination. The extremely high overvoltages can occur during the three-phase reclosing with trapped charge on healthy phases after the fault clearing.

A significant capacitive current of unloaded line can be expected when taking into account the parameters of a complex network (overhead lines + underground cables): the length of the cable(s), material characteristics, as well as the surge impedance variation. These data, along with the other elements of the network, determine the overvoltage level. In order to control it within acceptable limits, the following measures are examined: MOV surge arresters, shunt reactors for reactive power compensation, etc. The paper is an attempt to identify the most dangerous overhead line - cable combinations and their due overvoltage.

Considering temporary faults and the presence of non-linear equipment (power transformers, MOV arrester), two cases of overhead line - cable of 110 kV and 400 kV, respectively, have been studied (cable parameters are the ones presented by J.R. Attwood et. all. at CIGRE 1998 Session in Paris: 132 kV, single-core, 500 mm<sup>2</sup>; 132 kV, three-core, 500 mm<sup>2</sup>; and 400 kV, single core, 2 500 mm<sup>2</sup>). The study of these hypothetical cases is meant to calibrate the present computing tools that are to be used in estimating the stresses in future Romanian grid configurations.

All phenomena have been analysed using the EMTP. The data for network components (supply source, transformers, circuit breakers, overhead line, cable, surge arrester, loads) are based on manufacturer's information.