

Modifying the Transient Overvoltages in Mixed Power Networks by Inserting Cable Sections

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Mohamed M. Saied

The paper deals with the analysis of the electromagnetic transients in mixed power networks. Special emphasis is made on assessing the effectiveness of using cable sections in reducing the transients in the power network components such as transformer substations. A distributed parameter modeling of the overhead lines, underground cables and transformer windings is applied in the Laplace domain. The simulation can handle the different time waveforms of the sources initiating the transients, the lengths of the cable sections as well as the transformers' neutral treatment. The direct analytical s-domain solution is numerically inverted in order to get the corresponding time domain results. The affecting parameters such as the line and cable surge impedances, the length of the cable section (or its time delay) and the transformer data, are investigated. A case involving multiple-pulse lightning surges is also addressed. The results of four case studies of known solutions are presented in order to validate the developed mathematical model and computer program.



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