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Overhead Lines Induced Transient Overvoltage Analysis Using Finite Difference Time Domain Method

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Abstract : In this work, an approach based on transmission lines theory is presented. It is exploited for the calculation of overvoltage created by direct impacts of lightning waves on a guard cable of an overhead high-voltage line. First, we show the theoretical developments leading to the propagation equation, its discretization by finite difference time domain method (FDTD), and the resulting linear algebraic equations, followed by the calculation of the linear parameters of the line. The second step consists of solving the transmission lines system of equations by the FDTD method. This enabled us to determine the spatio-temporal evolution of the induced overvoltage.

Keywords : lightning surge, transient overvoltage, eddy current, FDTD, electromagnetic compatibility, ground wire
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