

New approach in time domain for evaluation of electric and magnetic fields near the lightning channel

ABSTRACT

The electric and magnetic fields due to lightning channel can be estimated by many methods such as Finite Difference Time Domain (FDTD) and dipole methods. Estimation of electric fields in time domain by dipole method for a realistic return stroke current along the lightning channel is very complex. On the other hand, the FDTD is an appropriate method for a close distance problem but it consumes high memory for the computer to process the result. This paper presents the combination of the FDTD and dipole methods for evaluation the magnetic fields at any observation points with less difficulty and less memory consumption. In addition, the use of the FDTD method provides the ability to evaluate the fields for the case of non-perfect ground conductivity. Hence, by applying the dipole and FDTD methods with the Caligaris et.al's algorithm, extended from Cooray-Rubinstein formula, the approach and formulation of electric and magnetic fields in time domain is proposed, with the consideration of the non-perfect ground conductivity effect. Results obtained from this new approach are compared with the measurements data published in literatures.