

## Effect of soil resistivity on the lightning current along tall towers

### ABSTRACT

A direct lightning strike on a tall structure may result in damage to the equipment that is installed along the tower. This may be caused by the behaviour changes of the lightning current value and wave shape along the tall structure. The influence of this behaviour change may be contributed to by the ground reflection factor. Previous studies have assumed that the ground reflection factor is a constant value. However, this factor depends on the correlation between the tower and ground impedance. Thus, the aim of this paper is to evaluate the behaviour of the lightning current along the tower and channel with respect to the variation of the ground reflection factor. The lightning current along the tower and channel are modelled by selecting the distributed current source model whereby the sum of two Heidler current functions is used as a channel base current. Also, the value of the soil resistivity is included in the circle electrode grounding arrangement in order to determine the variation value of the ground impedance. Thus, the results of this paper may be of benefit for the maintenance of telecommunication towers in order to set an appropriate protection level based on the soil resistivity and also when considering the installation of such telecommunication towers.

**Keyword:** Grounding system; Lightning; reflection factor; Soil resistivity; Tall structures