



## THE EFFECTIVENESS OF SURGE ARRESTERS ON THE MITIGATION OF LIGHTNING INDUCED VOLTAGES ON DISTRIBUTION LINES

Alexandre Piantini

Inst. of Electrotechnics and Energy / University of São Paulo

piantini@iee.usp.br

Av. Prof. Luciano Gualberto, 1289,05508-010, São Paulo - SP, Brazil

Jorge M. Janiszewski

Polytechnic School / University of São Paulo

jorge@lcs.poli.usp.br

**Abstract** - This paper presents some results concerning theoretical and experimental investigations about the effectiveness of surge arresters in reducing the magnitudes of lightning induced voltages on overhead distribution lines. Due to the complexity of the phenomenon and to the existence of divergent opinions on this matter, at first an experimental study was conducted through the use of a 1:50 scale model. A surge arrester model was developed and two distribution lines were built and disposed symmetrically with respect to the return stroke channel model. One of the lines was equipped with surge arresters, whilst the other had no protection. The voltages induced on both lines were measured simultaneously. Several tests were performed under controlled conditions, in various situations, and it was possible to evaluate the influence of parameters such as the grounding resistance, surge arrester spacing, stroke current magnitude, etc. on the lightning induced voltages. A full-scale system designed for the same purpose was implemented at the campus of the University of São Paulo and started to operate at the end of the 2001/2002 thunderstorms season. The study adopts the same methodology conceived for the previous investigation and many voltages' waveforms have been recorded. This paper presents some results obtained from these experimental investigations and also a theoretical analysis, carried out with the Extended Rusck Model (ERM), of the effectiveness of decreasing surge arrester spacings as a means of improving the indirect lightning performance of distribution lines, *Keywords:* electromagnetic induction, lightning induced voltages, power distribution lines, surge arresters.