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**Generation of Non-standard Lightning Impulse Unipolar Waveshapes**

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**ABSTRACTS**

As the reliability of the power lines depends on the lightning performance of the connected equipment, whose withstand capability is directly related to the amplitude and waveform of the lightning surges, it is essential to evaluate the behavior of insulators when subjected to lightning impulses with waveforms similar to those of real overvoltages. This paper presents, initially, some typical lightning induced voltage waveforms, based on measurements performed in full-scale lines and in tests with reduced-scale models. It then presents a general test circuit that can be used to generate such impulses in laboratory. Since high-voltage impulse generators usually provide pre-set outputs via fixed-value internal elements, the required settings to obtain the desired impulse parameters (front time and time to half value) involve the insertion of components (combinations of resistors, inductors, and capacitors), which is usually not trivial. In addition to the standard lightning impulse, the following impulses have been considered: 1.2/4  $\mu\text{s}$ , 1.2/10  $\mu\text{s}$ , 3.0/10  $\mu\text{s}$ , and 7.5/30  $\mu\text{s}$ . The volt-time curves corresponding to the four selected nonstandard impulses, of positive and negative polarities, are presented. In comparison with those of the 1.2/50  $\mu\text{s}$  impulse, important differences are observed, especially in the case of impulses with longer front times.