Decay of charge deposited on the wall of gaseous void

After partial discharge activity within a gaseous void, charges accumulate on the wall of the void. The decay of such charges due to surface currents at the void wall is studied analytically, and the factors affecting this decay are indicated. The results show that in terms of the basic time constant, the decay can take a considerable amount of time. The decay rate is significantly reduced by an increase in the permittivity of the bulk medium. The dominating influence of this permittivity is likewise reflected in the increased duration and thereby prolonged inhomogeneity of the electric field sustained in the void. However, the absolute value of this field is reduced with an increase in bulk permittivity. It is concluded that the present choice of a point charge to simulate the wall charge has the disadvantage that such a source is associated with a field singularity, and thus it is not possible to represent the maximum field at the void wall in a realistic manner.