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COMPUTATION OF THE POTENTIAL INDUCED ON THE FLUID TRANSPORT PIPELINES BY OVERHEAD HIGH VOLTAGE LINES

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Abstract

The paper focuses on the evaluation of the hazardous induced potentials on metallic pipelines that convey fluids such as gas, petroleum, oil and shares the same right-of-way corridors with high voltage (HV) overhead power lines (OHL). For this purpose a dedicated computation software package was developed. The 3D numerical analysis of the AC electromagnetic interferences generated by the HV lines working on normal or fault conditions to the neighbor pipeline networks is based on a coupled Finite Elements (FEM) – Boundary Elements (BEM) model. In the first part of the paper the theoretical background is outlined and the problem governing equations are presented. Details about the 1D – FEM model developed for the interior of the pipeline and the 3D – BEM model set-up for the pipeline external domain are emphasized. In the second part of the paper numerical computation examples are presented. The effect of a fault in the HV line circuit on the shape and magnitude of the hazardous induced potential distribution along the victim pipelines is detailed and discussed. The final conclusions end the paper.

Key words: AC electromagnetic interference, computation package, FEM – BEM coupled model, hazardous induced potential, pipe elements

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