

DOI: <https://doi.org/10.15407/techned2018.01.017>

DEFECTS OF CONDUCTOR SCREEN AND THEIR INFLUENCE ON ELECTRIC FIELD DISTRIBUTION IN POLYETHYLENE INSULATION OF POWER CABLE

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 1, 2018 (January/February)
Pages	17 – 22

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Abstract

The electric field distributions in the cross-linked polyethylene (XLPE) insulation of power cable with defects in the conductor screen at macro- and microlevels are studied using multiscale modeling. The surface roughness, protrusion of the screen into the insulation and bridging channel in the conductor screen as macro-sized defects as well as the porous structure of the

screen as micro-sized defect are modeled and examined. The electric problem for macrodefects is coupled with the problem for microdefects solved in the appropriate region of the screen. The considerable electric field enhancement near the defects is revealed by numerical simulation. From such view point, the degradation of the insulation in its local regions with the potential formation and growth of water trees is explained. References 11, figures 5.

Key words: XLPE insulated power cable, conductor screen, manufacturing and operational defects, porous structure, three-dimensional models, multiscale modeling.

Received: 19.06.2017

Accepted: 22.06.2017

Published: 29.01.2018

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