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THE STUDY OF MAGNETIC FIELD OF POWER CABLES IN POLYETHYLENE PIPES WITH MAGNETIC PROPERTIES

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Abstract

In the article, the magnetic field on the ground induced by underground single-circuit 330 kV cable line is computed and analyzed when the power cables are laid in polyethylene pipes. As proposed by contrast to the traditional construction, the fine-dispersed magnetic fraction is added to the polyethylene material of the pipes and, due to this, the polyethylene has effective magnetic properties. Such pipes can serve as a magnetic shield that reduces the magnetic field on the ground. The two different structural variants are studied: 1) when each phase cable is located in separate pipe with magnetic properties and 2) all three cables are in common pipe. As revealed by simulations, the use of three polyethylene pipes as magnetic shields is ineffective, and one common pipe for all three cables can reduce the field on the ground by an order of magnitude. The influence of the effective magnetic permeability of the polyethylene, as well as the pipe dimensions (radius, wall thickness) and shape of the pipe (closed shape in cross section or half pipe) on the shielding efficiency is studied. References 14, figures 6.

Key words: underground cable line, polyethylene pipe, effective magnetic permeability,

magnetic shield, permissible magnetic field level, computer modeling.

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