

## **Steady State Condition of Cable Line 10 kV at Single-Phase to Ground Fault with Resistive Neutral Earthing**

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### **Abstract**

The work is devoted to the study of the steady state mode of cable line 10 kV at single-phase short circuit and resistive grounding of the neutral. A model of a cable line, implemented in the MATLAB-SIMULINK package was used. Also the models of supply transformer and additional transformer for creation of artificial neutral point were used, based on available standard elements. So, the specifics of operation of additional transformer for creation an artificial neutral point and real parameters of the cable and transformers were taken into account. It is shown that in the resistive grounding mode the nature of the displacement of the linear supply voltages triangle at variation of the fault resistance differs from what takes place in the partial compensation and overcompensation modes. At single-phase short circuit and any value of fault resistance, the choice of the value of the resistor in the neutral significantly affect the magnitude of the current and voltage in it. However, the current and the voltage at the place of damage at large values of the fault resistance does not significantly depend on the value of the neutral resistor.

*Keywords: cable distribution lines, steady state mode, single-phase failures, resistive grounding of the neutral*

### **References**

1. R. Willheim and M. Waters, "Neutral grounding in high-voltage transmission" in Introduction by R. Rudenberg. Moscow, pp. 415, 1959.  
[Google Scholar](#)
2. F.A. Likhachev, "Earth faults in networks with isolated neutral and compensation of capacitive currents", *Energy*, pp. 152, 1971.  
[Google Scholar](#)
3. I.M. Sirota, S.N. Kislenko and A.M. Mikhailov, Neutral modes of electrical systems, Kyiv:Publishing House of the Academy of Sciences of the USSR, pp. 264, 1985.  
[Google Scholar](#)
4. R.A. Weinstein, N.V. Kolomiets and V.V. Tomsk Shestakova, Neutral grounding modes in electrical systems, TPU publishing house, pp. 118, 2006.  
[Google Scholar](#)
5. V. Bosneaga, V. Suslov, I. Stratan and I. Dobrea, "The peculiarities of the steady state modes of medium voltage cables grid at various neutral grounding and single-phase to ground

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failure", *12th International Conference and Exposition on Electrical and Power Engineering*, October 20–22, 2022.

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6. V. Bosneaga, V. Suslov, I. Stratan, I. Dobrea et al., "The peculiarities of the steady state modes of medium voltage cables grid 6–35 kVat steady-state single-phase short circuit to ground with over compensation of failure current" in Collection of articles «Energy Security and Controlled Power Transmissions», Institute of Energy of Moldova, vol. 13, no. 28, pp. 114-122, 2022, ISBN 978-9975-158-68-8.

[Google Scholar](#)

7. V. Bosneaga, V. Suslov, I. Stratan and I. Dobrea, "The Peculiarities of Steady State Condition of Medium Voltage Cable Line 10 kV in Partial Compensation Mode of Neutral Grounding at Single-phase to Ground Fault", *Modern Power Systems Conference 10th edition MPS 2023*, 21–23 of June 2023.

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